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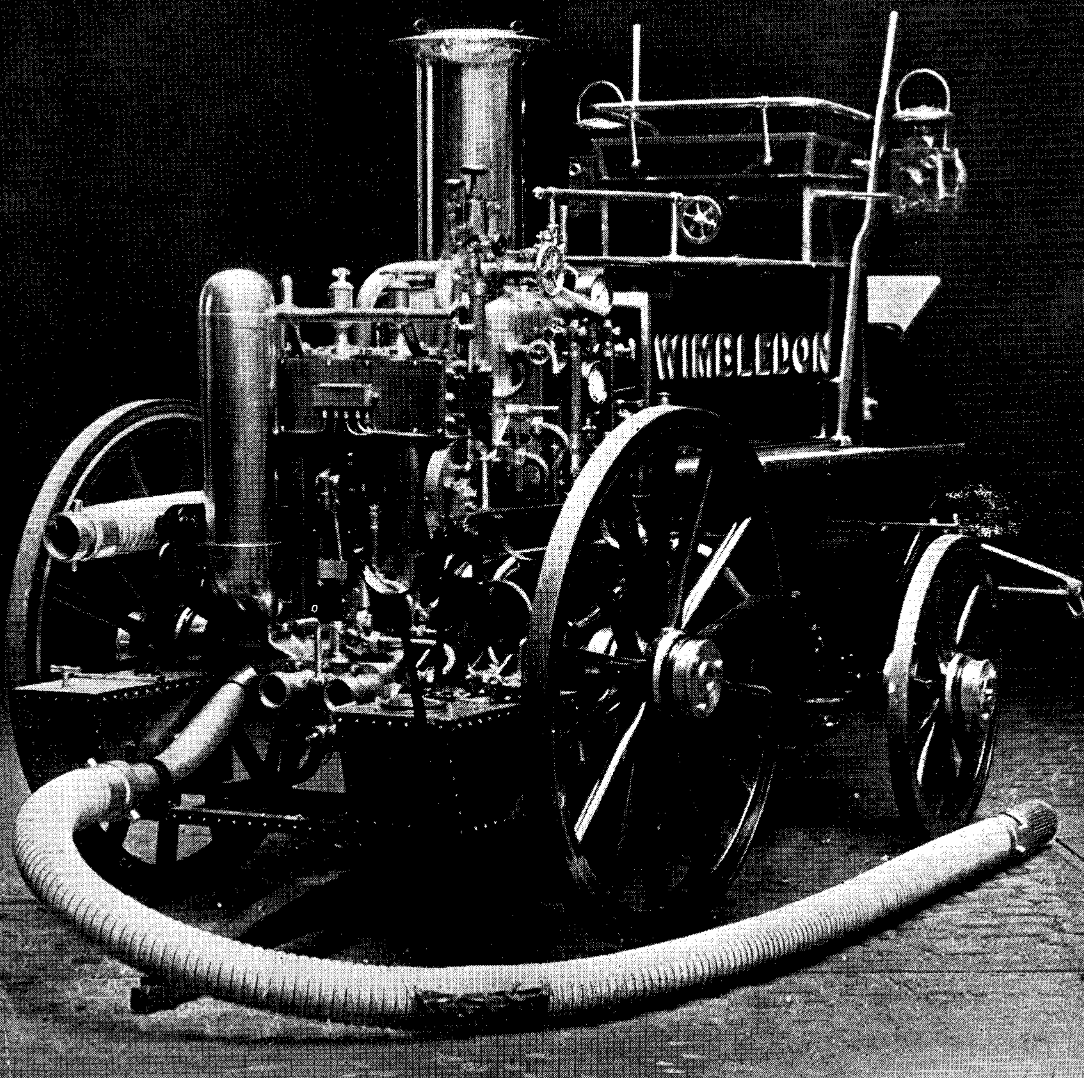


The MODEL ENGINEER

PERCIVAL MARSHALL & CO. LTD. 23, GREAT QUEEN ST., LONDON, W.C.2.

8TH FEBRUARY 1951 VOL. 104 NO. 2594

SMOKE RINGS

Early Craftsmen

● COMMENTING UPON a "Smoke Ring" in our issue for January 18th, under the heading "Craftsmanship," Mr. Kenelm Armytage writes: "Craftsmanship has been declining during a longer period than 45 years, surely? 2,300 years would be nearer the mark. Between the years 400 and 280 B.C. the Greeks brought craftsmanship to a higher level than at any time, before or since."

In support of this statement, Mr. Armytage enclosed some plates taken from a recent sale catalogue, showing some of the thousands of coins struck by ancient Greeks. The coins are examples of the work done during the 600 years of ancient Greek art and are of average skill; moreover, they are not restricted to the period mentioned above. Most of the best specimens are to be found in museums, of course, but a few can still be acquired privately; Mr. Armytage possesses a small collection and he says he derives immense pleasure from contemplating the lovely designs of the artists and the amazing skill of the die-sinkers and engravers. The bronze dies from which the coins were struck were cut by hand, unlike the process of today which has recourse to reducing machinery, the original being, perhaps, 6 in. in diameter.

The illustrations which Mr. Armytage sent certainly bear out his assessment of the craftsmanship and skill that must have been applied all those hundreds of years ago. To us, the real point seems to be that the work of the true craftsman, who naturally derives joy and pride in his endeavours to achieve perfection through the exercise of real care and infinite patience, has always stood out well above work produced by "easier" methods; and it still does.

Ploughing Engines in Herts

● A READER at Much Hadham, Herts, has written to say that ploughing engines are still being used in that area. During the winter they are busy threshing, but now they will be going over to ploughing.

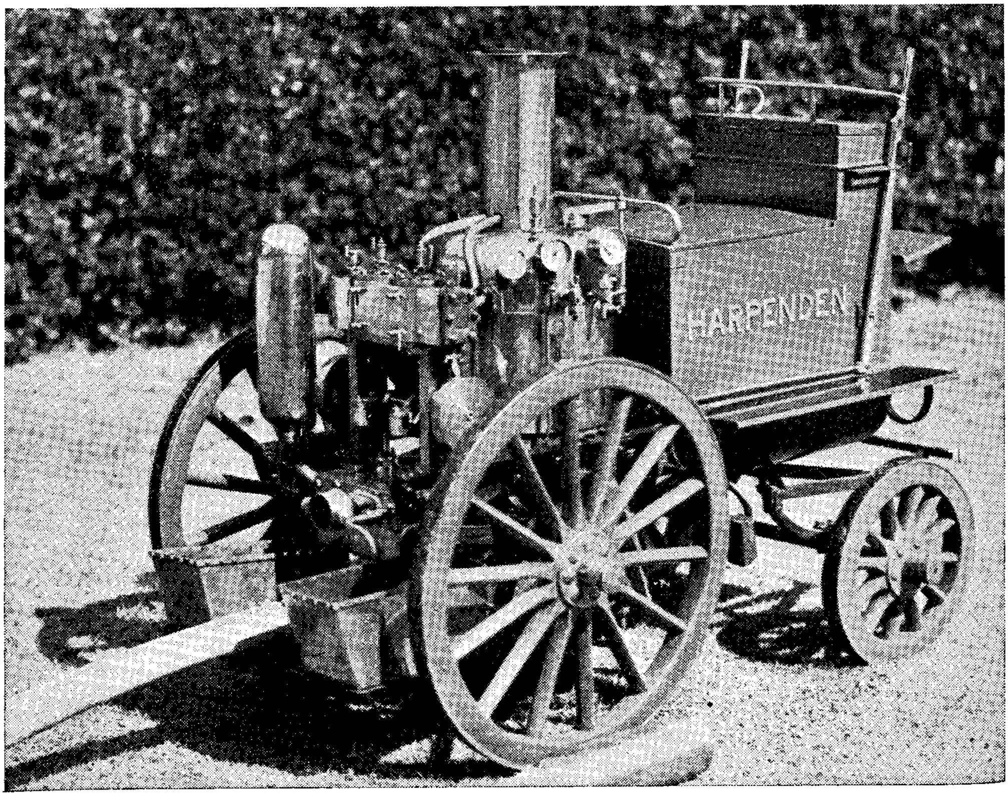
The headquarters for these engines are behind Little Hadham church, on the Ware-Bishop's Stortford road, about three miles west of Bishop's Stortford station. There will be found a number of Fowler compound and single-cylinder engines. A few years ago, there were 14 pairs of compounds in service, but now there are about seven pairs at work. The main reason for this seems to be that the young men of today will not work on the engines, owing to the hours, and the result is that there are more orders for ploughing engines than can be handled.

We are inclined to think that there are many "M.E." readers who, if they could have the chance, would be glad to work these engines, whatever the hours!

Our Cover Picture

● THE STEAM fire engine is now one of those things which are seen no more outside of museums; but it makes a most interesting prototype to be reproduced to scale in miniature.

Mr. R. A. Briggs, now in his 83rd year, recently sent us two photographs, one of which is reproduced on our cover and the other on this page. In his letter, Mr. Briggs wrote :—



"Going through some old papers, I came across the photograph of one of Shand Mason's double vertical fire engines, and even after 40 years the photograph is clear and sharp. This engine, made for Wimbledon, was one of the last to be built, I believe, and was fitted with expansion gear, oil firing, etc.

"I am sending also a photograph of my large scale model, which is about one-third full size and was made before I had the photograph of the Wimbledon engine, which was given to me by the firm when I went on behalf of the Harpenden Council to buy them one of Shand Mason's single verticals, reconditioned, and a very fine job it was.

"My engine still carries the original 100 lb. pressure and the steel boiler is in perfect condition, fired by oil. She throws a good jet on to the roof of my house, and is, as you will see, a double vertical, now 44 years old."

It is a pity that horses cannot be modelled—another case of the impossibility of scaling Nature! But these old, horse-drawn fire engines were immensely impressive, when proceeding to a fire, with their galloping horses, shouting men and the rather frightening stream of flames or sparks emerging from the tall, brightly polished brass funnel. Visitors to London in those days, always regarded the rushing fire engines as one of the "sights" of the place.

News from Tasmania

● WE WERE pleased to receive, just lately, a letter from Mr. E. G. Hey, hon. secretary of the Hobart Society of Model Engineers. He sends cordial greetings from his society "to all model engineering enthusiasts in the 'Home Land'" which we hereby pass on.

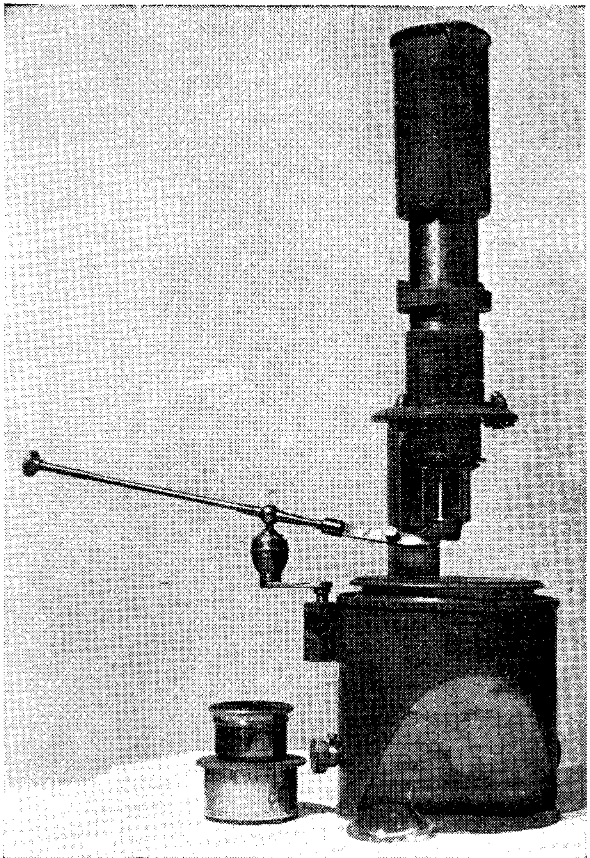
Mr. Hey states that the Hobart S.M.E., although it is only a small society, has made good progress during 1950. Early in the year, an exhibition was held and proved to be very successful; one result was the acquisition of 40 new members.

We are glad to learn of such an excellent result, and also that, after many setbacks, negotiations with a suburban council have resulted in the society obtaining the use of a plot of land where outdoor events can be held. The laying down of a car racing track and a lawn for line-control planes are to be put in hand, and it is hoped to add a speed-boat pool later on.

A Microscope

Made from Scrap

by H. H. Nicholls



THE writer wanted a cheap, good microscope, and set about making one, in the following manner.

An eyepiece, of the usual "Huyghens" type used in compound microscopes, and an objective lens, of the "one inch" power, made by J. Swift & Sons many years ago, were obtained from Messrs. Dollond, the well-known London opticians, at a moderate price.

Beneath the stage, as a "condenser," a bull's-eye from an old electric torch was placed in a carrier, and below that a flat mirror obtained from a worn out lady's handbag, discarded by a relative, and salvaged by the writer.

Referring to the explanatory sectional drawing, the eyepiece is seen at the top of the tube, at *A*, the objective at *B*, the condensing lens at *C*, and the mirror at *E*. *D* is the body of the microscope.

Particular importance attaches to the collar lettered *F*. This is fixed on the tube by a set-screw, *G*, at a distance which will prevent the objective coming into contact with objects being examined, or a glass slide.

Focussing is accomplished by sliding the tube in the sprung collar *H*. The springing is obtained by cutting a T-shaped slot detailed at *J*.

The collar is made from an old gunmetal bearing, attached to a steel ring *K* by three hooked bolts *L* and $\frac{3}{16}$ in. Whit. nuts. The ring *K* is welded to a piece of 2 in. × 2 in. × $\frac{1}{4}$ in. angle steel, $\frac{1}{2}$ in. wide. Two $\frac{3}{16}$-in. Whit. screws *M* attach this to a piece of brass *N*, in turn soldered to a most interesting part of the instrument, a 2-lb. Tate & Lyle's syrup tin, *O*.

A hole $\frac{9}{16}$ in. diameter is cut in the lid of this tin, and a brass disc, or a steel washer, *P*, is attached by two small screws, while the bracket *Q*, sliding on a $\frac{3}{16}$ in. stem and locked by a set-screw, carries the condensing bull's-eye, *C*.

Two holes are drilled in the syrup tin to carry the mirror *E* in its carrier detailed at *R*. *S* is a piece of brass soldered to the tin, in which fit the "stage forceps" to be described separately.

On the end of the rod passing from the mirror carrier *R* is a brass wheel *T*, which serves to incline the mirror as may be necessary. Having made the stand with these parts, and placed in position the optical elements mentioned, I had a practical, cheap microscope, not to be compared with modern, commercially made examples, but quite powerful and useful.

A Special Thread

Attention is directed to the detail of the objective screw thread which must enter the screwed ring at the bottom of the tube, which I have drawn for the information of those not in possession of the "M.E." handbook *A Guide to Standard Screw Threads and Twist Drills.*

The thread shown is known as the "Royal Microscopical Society's Standard Objective Thread," and is used by all makers of microscope lenses at the present time, so that the lens one may use on this microscope can be used on a proper commercially made microscope if one is acquired later on; even so, a simply-made stand as described will be found of service in examining messy liquid objects, in which the stage must, in any case, be flat; what is referred to as the "stage" is the flat top of the canister which forms the base of this instrument, and on which the objects, on their glass slides, are placed for examination.

The writer recommends the purchase of a book

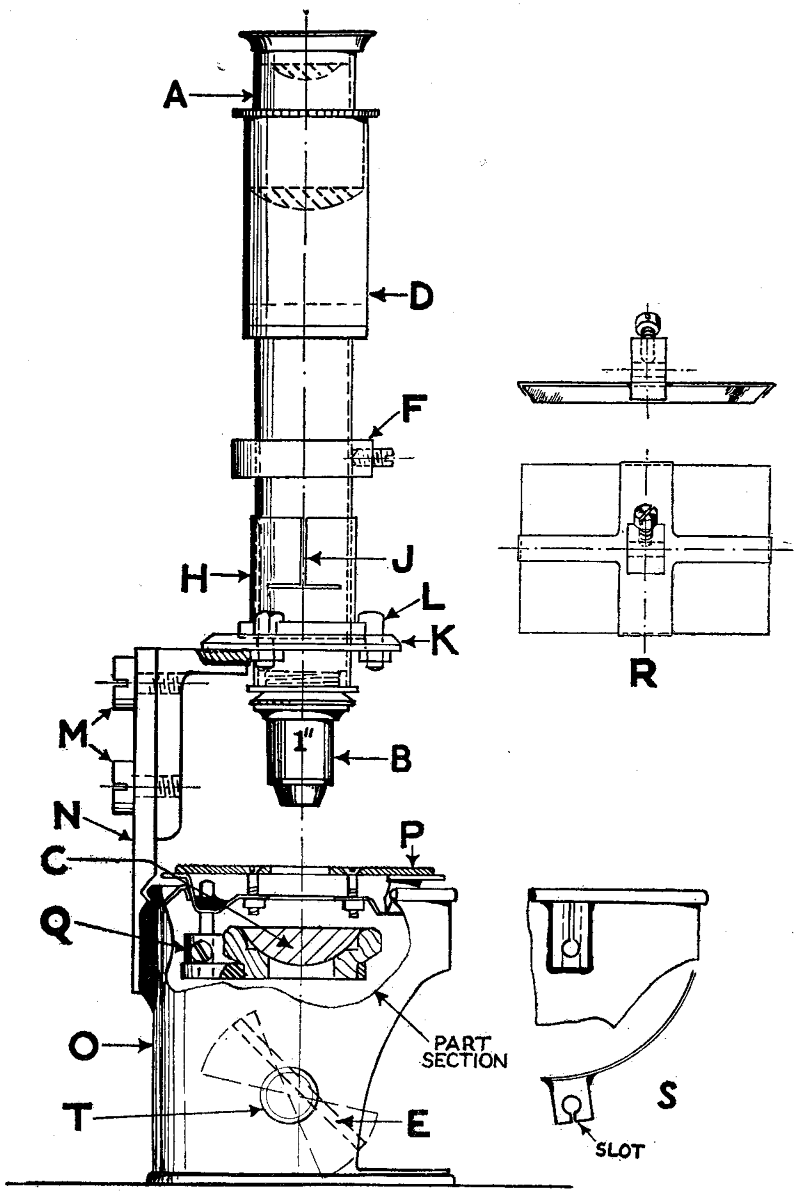


Fig. 1. *General arrangement and details of the microscope*

on the microscope ; Messrs. Dollond, for example, from whom suitable lenses may be obtained, would be able to direct the user to the appropriate manuals, or supply them.

When the user has studied the use of the microscope, he will understand the use of the "stage forceps" now to be described and which fit into the socket *S*, and are seen in the photograph. The writer strongly recommends the making of these, as by their aid parts of insects, flowers, minerals, etc., can be turned about at will, while upon a spike, as shown, can be placed a piece of cork for the reception of pieces of mineral, etc., by being pressed into it, or pinned to it.

In order to avoid confusion with the letters used in describing the microscope, the parts of the forceps will be referred to by numbers.

Fig. 3 shows the forceps assembled, and the several parts in detail.

No. 1 is the assembly complete. No. 2 indicates

the way in which the blades are slightly sprung apart. At the opposite end of the stem, made of 3/32 in. diameter steel, a point is formed, No. 3, usually covered by the knob shown, which has a slot cut to spring it on to the end of the stem. The detail, No. 4, shows how a cork is put on the end of the stem, by the point, so that, after being cut as shown, it will accommodate objects, attached by a thin gum, or by the small pin, about $\frac{7}{16}$ in. long, shown at No. 5.

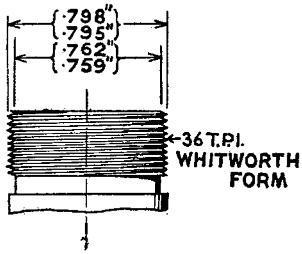


Fig. 2. Microscope objective screw thread. Royal Microscopical Society's form

The detail, No. 6, shows how the blades (best made of thin clock-spring $\frac{1}{4}$ in. wide) open, when one presses the brass button which is riveted over in the back blade, and passes through a clearance hole in the front blade.

The detail, No. 7, shows how the stem obtains its movement, and must be studied in conjunction with the assembly, No. 1.

Two balls, about $\frac{7}{16}$ in. diameter, are connected by a stem, $\frac{1}{8}$ in. diameter, screwed at the ends and then soldered very carefully, so no solder shows, but the lid of the vase-shaped object in detail No. 7 must be made and placed over the lower ball before sweating up the thread into the upper ball, previously drilled for the slotted, sprung tube in which the stem is moved, and held where wanted.

The ball-and-socket joint is formed, by turning the lid to the shape shown, with a 40 t.p.i. screw thread to engage with the vase-shaped lower part, which is fixed into the arm by which one attaches the forceps to the microscope, by pressing into the slotted piece, lettered *S* in the general drawing of the microscope, Fig. 1. There is placed, under the ball, a pad of cork, so that the springy nature of that material suffices, instead of a metal spring, for the joint.

If there is difficulty in turning the interior of the lid or retaining cap of the ball-and-socket joint, detail No. 8 shows how a tool can be made (with clearance underneath) to the profile where *r* is the radius of the ball to be used, probably 7/32 in. for a $\frac{7}{16}$ in. ball, will be found the most convenient size to make, the whole assembly being about 6 in. long.

When the forceps are added to the microscope, one has an "elementary," yet very useful microscope, at a mere fraction of the price one has to pay for the normal type. When, however, some experience has been gained with this sort of instrument the user will want to buy a more elaborate one, from the opticians who deal in them.

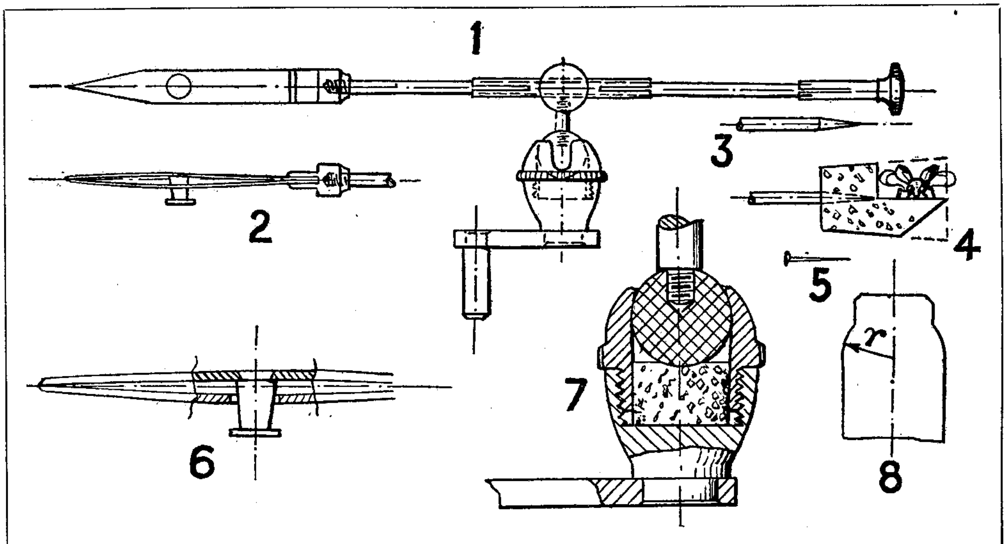


Fig. 3. Details of the "stage forceps"

There is one more detail worth describing; if one buys a "bull's-eye" lens on a stand, and will put a circle of black paper (of a size only to be found by trial) on the surface of the condensing lens *C*, Fig. 1, the effect known to microscopists as "dark ground" will be produced, which is the best way to illuminate many transparent articles; an electric lamp in a biscuit box on the table will provide all the light necessary. If too bright, a sheet of tissue paper will soften the illumination.

THE CHESTERFIELD M.E.S. EXHIBITION

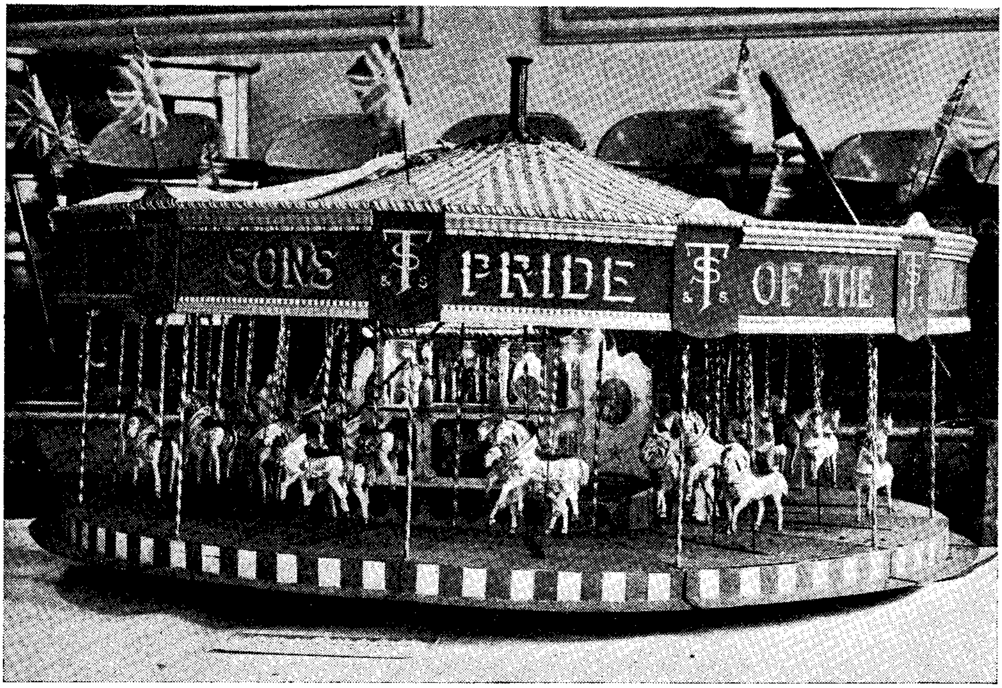
Described by W. J. Hughes

(Photographs by Press Photo Agency, Sheffield)

THERE can be no doubt that the 1950 first post-war show of the Chesterfield Model Engineering Society was a huge success, especially from the point of view of quality. Indeed, one could expect little else from a town which, though comparatively small, has an excellent reputation for engineering products of the most varied kinds.

Added to the work of the Chesterfield lads were models from Sheffield, Nottingham, Leicester, Buxton, Rotherham, Lincoln, Doncaster, Mansfield, and last but not least, our old friend Fred Smith, of Pinxton.

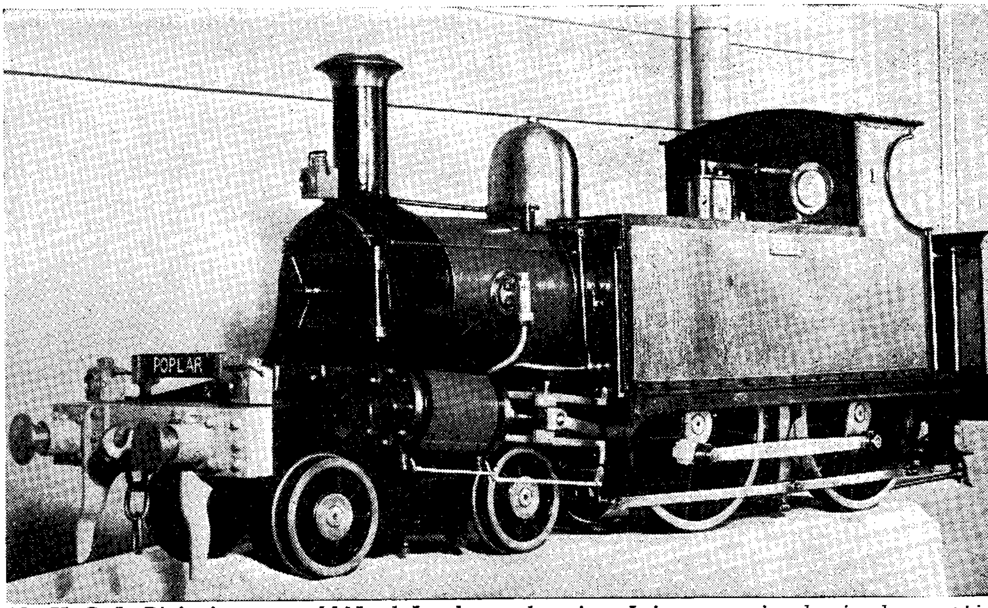
I think the model which rightly attracted most attention was the $1\frac{1}{2}$-in. scale 3-abreast Galloping Horses by S. and R. Taylor of Leicester. Not only was the model steam driven and coal fired, but it produced the most satisfying and nostalgic fairground music. This was done by concealing a loud-speaker behind the "organ," and playing the music on an amplifier. The model was brilliantly lit, and even the "human figures," or rather statues, standing in front of the organ played the cymbals and triangle in the approved style of the prototype. This fascinating model was under steam throughout the whole exhibition, and its builders are to be congratulated on a fine piece of craftsmanship. We may note that the roundabout was finished in 1937, and that Mr. Taylor and his son are now building a second one, and also two Burrell showmen's engines to go with them—a single-crank and a double-crank compound.



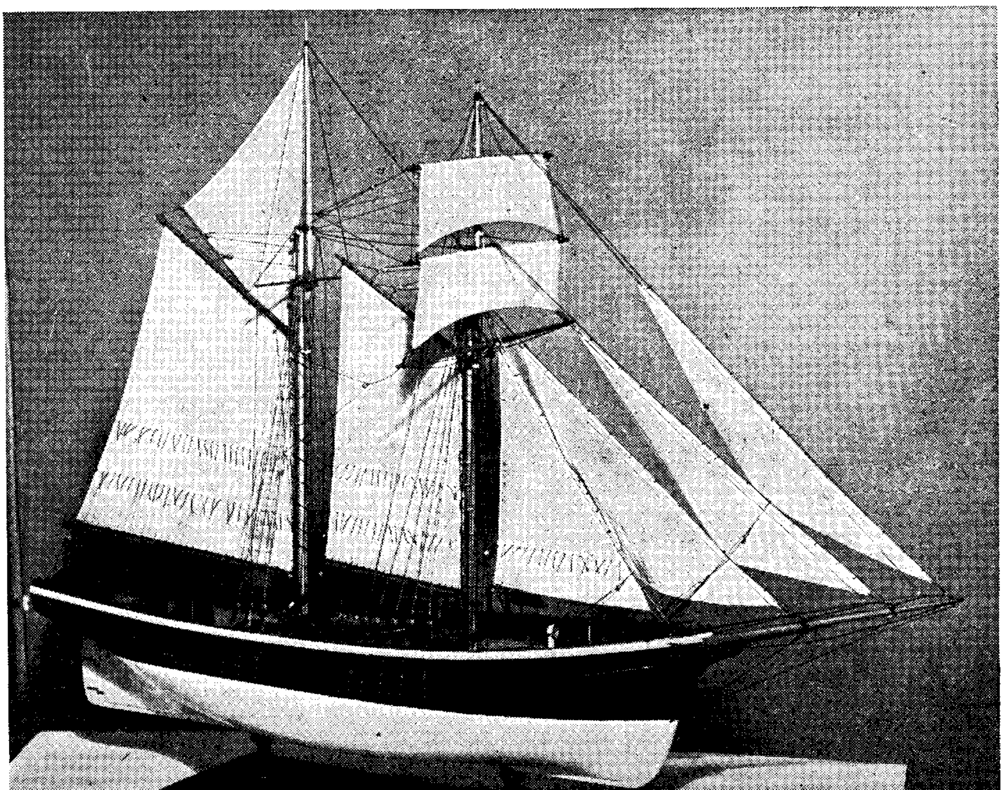
The fine three-abreast gallopers to $1\frac{1}{2}$ in. scale by S. and R. Taylor, of Leicester

Another fine model from the same builders was the $\frac{1}{2}$-in. scale "Pollitt single-wheeler" of the former G.C.R. (earlier M.S. and L.R.). By one of those coincidences which can only occur in real life, I had half-an-hour earlier been looking at a photograph of another model of the self-same engine in THE MODEL ENGINEER for April 1st, 1926! The only differences were in detail, for the "Taylor" engine is to the old M.S. and L. outline with stove-pipe chimney, tender with flared coping, and small cab, while the 1926 engine is as rebuilt by the G.C. Incidentally, I wonder if "L.B.S.C." still has that model in his possession?

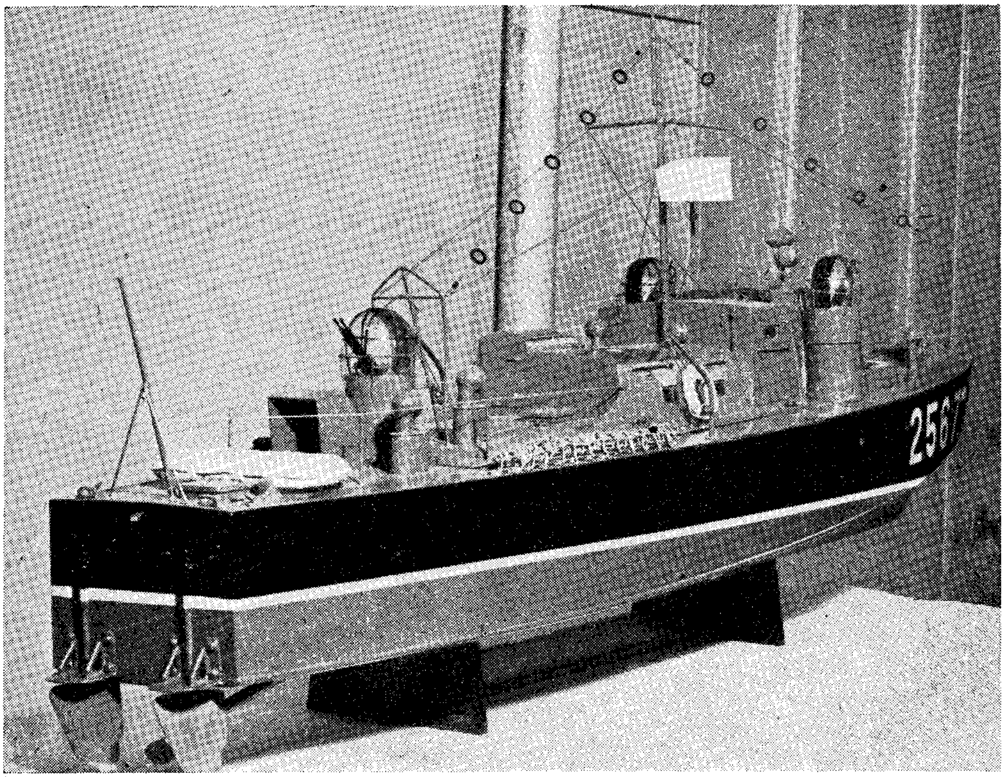
Among the locomotive models, one of the most



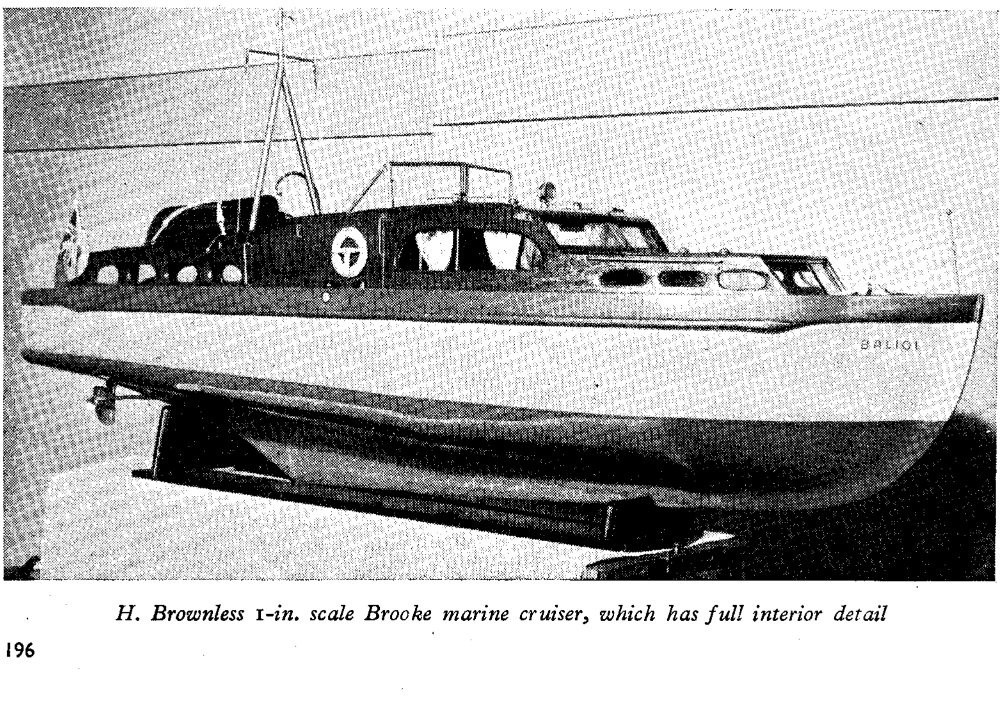
Mr. H. G. L. Pitt's sixty-year-old North London tank engine. It is a great pity that in photographing this and other models by photo-flood, the paintwork is made to look very rough, which, in fact, it was not



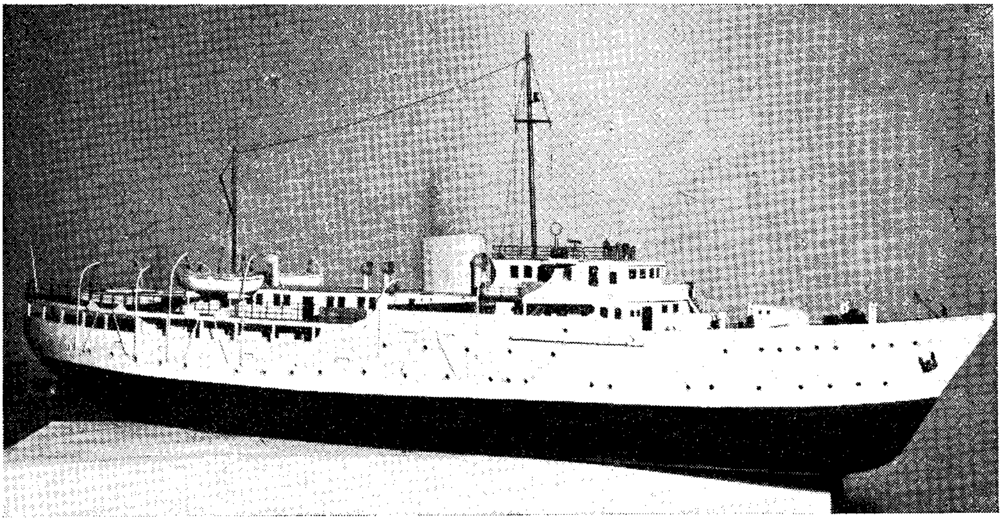
A coasting topsail schooner to ¼-in. scale by C. J. Clarke, of West Bromwich



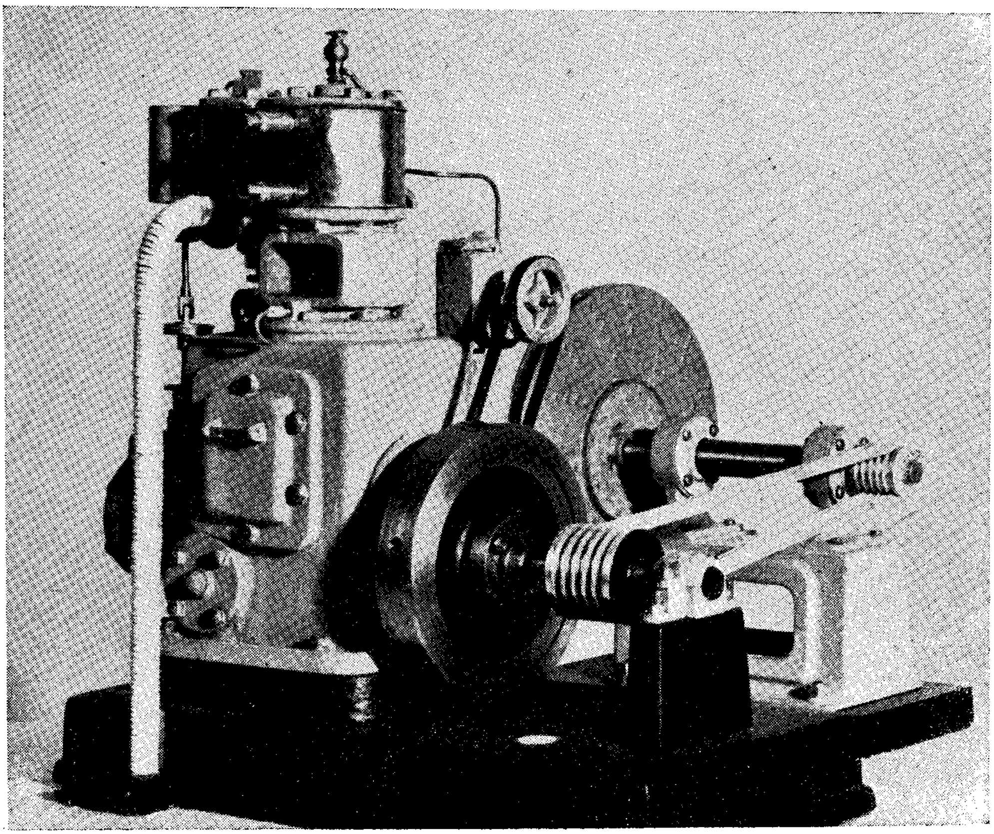
A well-detailed ½-in. scale model of a Vosper air/sea rescue launch by E. D. Moseley, of Chesterfield



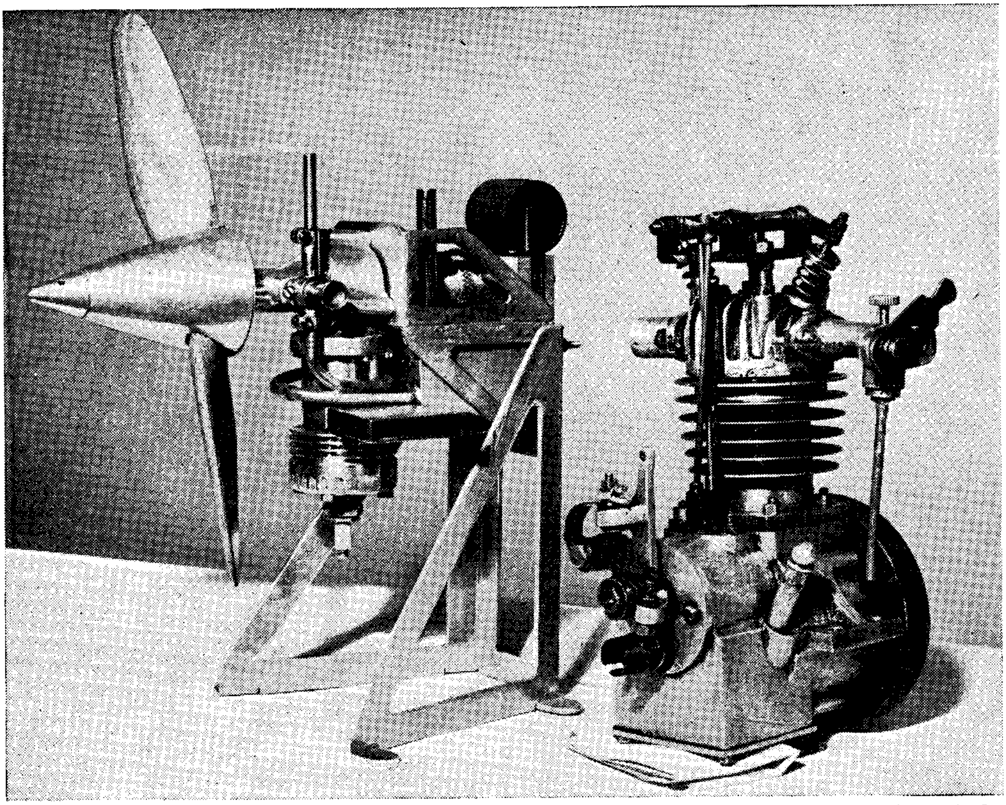
H. Brownless 1-in. scale Brooke marine cruiser, which has full interior detail



A twin-screw electrically-driven motor-yacht loaned by J. Evans, of Baslow, Derbyshire



The high-speed steam engine driving a fan booster (unfinished) by D. King, of Chesterfield



Left—A 7.5 c.c. magneto-equipped aero-engine by D. Shaw. Right—A 15 c.c. "Kittiwake" by D. Jackson

striking was a genuine old-timer built more than 60 years ago—a $6\frac{1}{2}$-in. gauge (yes, most unusual these days !) 4-4-0 passenger tank locomotive of the late North London Railway. This large model was built originally as a showcase exhibit, with all wheels friction-driven from an electric motor. In 1938, however, it was converted to real work, and became a pukka coal-fired passenger-hauling locomotive, with a working pressure of 80 p.s.i., and cylinders $1\frac{3}{4}$ in. bore by 2-in. stroke. Driving wheels are 8 in. diameter.

The ship-modelling fraternity was well represented, and a very satisfying exhibit was the two-masted topsail schooner by C. J. Clarke of the Birmingham S.M.S. Built to a scale of $\frac{1}{4}$ in. to 1 ft., this represented a British coasting type of vessel, and there was some very nice deck detail, while the veneered stand alone is a handsome piece of craftsmanship.

A well-detailed model of a Vosper A.S.R.L. was shown by E. D. Moseley of Chesterfield, and although I may be wrong, I feel inclined to take a little credit here, for I believe Mr. Moseley made many of his fittings with one eye at least on my series of articles on this subject* two or three years ago ! But whether or no, he is to be commended on a very fine effort. The hull is carved from the solid, and electric drive is fitted.

The inch-scale 48-ft. cabin-cruiser by H. Brownless of Doncaster was built to drawings supplied by the builders of the prototype, Brooke Marine Ltd. This has full interior as well as exterior detail, by the way ; even the electric motors are dressed up as diesels, and the cabins are fully furnished.

Also about 4 ft. long was a motor-yacht loaned by Jack Evans of Baslow. This genial chap is "mine host" at a hostelry which boasts a well-equipped "ship-room" well worth a visit by anyone interested in ships, even if not in malt-liquor ! As will be seen, this yacht is of modern lines, with plenty of detail, and I should imagine looks very well on the water.

Road Locomotives

There were no fewer than eight exhibits in traction-engines and road locomotives, but I feel sure that none of the other seven will mind my saying that the outstanding one was the super-detailed 2-in. scale Fowler Showman's Engine by the brothers C. W. and A. A. Verity. This magnificent machine has been illustrated in THE MODEL ENGINEER on two or three occasions, and is a very fine reproduction indeed of the full-sized locomotive.

* "Making Ship's Fittings," THE MODEL ENGINEER, commencing April 22nd, 1948.

In fact, only one thing spoils it to me, which is that the overhead valves are parallel with the cylinder bores, and driven by rockers, instead of being sloping, and driven direct by the Stephenson valve-gear.

Another model on show was a $\frac{3}{4}$-in. scale spirit-fired traction-engine by R. Johnson of Peterborough. This is a first attempt, and shows great promise, but it should be catalogued as "free-lance," and *not* as a "Burrell." I hope also that in his next model Mr. Johnson will pay more attention to proportion, and, preferably, work to correct drawings.

There were many stationary steam engines, and to represent this class I have chosen a totally enclosed high-speed engine driving a fan booster, built by D. King, of Chesterfield. The fan is unfinished, but the engine is very neat and nicely made.

The two petrol engines shown are both by members of the home society—the "Kittiwake" o.h.v. by D. Jackson, and the 7.5 c.c. aero-engine by D. Shaw. It will be noted that the latter is magneto equipped, a feature very popular among the Chesterfield lads. This is probably due to the influence of P. W. Pearson, a member who was a pioneer of this type of ignition for small i.c. engines many years ago, and whose engines invariably are good starters. He is now very interested in radio control and gave frequent demonstrations with his ultra-lightweight apparatus at this show.

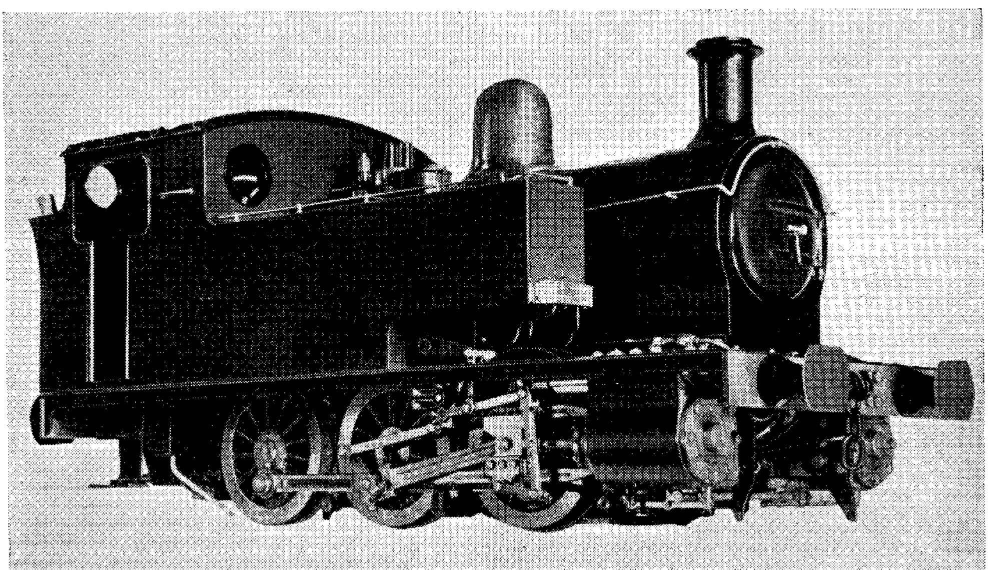
Locomotive Drawings

MESSRS. KENNION BROS. (HERTFORD) LTD., have favoured us with a set of blueprints for their 5-in. gauge 0-6-0 tank locomotive *Butch*; we also reproduce a photograph of the engine to show its compact and well-proportioned appearance.

There are twelve sheets in the set of blueprints and they show every detail of the arrangement and construction of this pleasing little engine. The general design is based on the old Glasgow & South Western shunting engines designed by Mr. Peter Drummond in 1918, but that, apparently, does not prevent the miniature version combining speed with power; for, on the Malden society's track, this engine has been timed to cover a lap of 1/6 mile in just over 60 seconds, hauling ten adults and two children, or rather more than 15 cwt.

All the details appear to be robust and well designed, and although a considerable amount of machining is called for in the construction of this engine, it is well within the capacity of the normal amateur workshop. The drawings are arranged in a progressive order, ensuring that the construction can proceed in a logical order from start to finish. We notice a fairly obvious slip on Sheet 10; in the half-front view of the smokebox, the drawing calls for a $1\frac{5}{8}$-in. diameter hole behind the door, whereas this should be $3\frac{1}{4}$ in. (i.e. the *radius* is $1\frac{5}{8}$ in.). However, in view of the great amount of detail given in the drawings, errors are commendably absent.

This engine should appeal to anyone requiring a robust, powerful, compact and good-looking unit for use hauling heavy loads of passengers on 5-in. gauge.



Heating the Model Engineer's Workshop

by Andrew Todd

I WAS much interested in the article on rust proofing which appeared in THE MODEL ENGINEER towards the end of last year. I have been bothered with sweating of tools for a number of years; I am also one of those unfortunate people who, on handling a piece of bright steel, will find that in a few hours, rust sets in as a result. I have tried a number of the usual remedies and patent solutions that have been on the market, without much success. Most of them are too gummy and leave a sticky deposit, especially when handled with oily hands.

For some years I used a lanolin preparation, consisting of 3 oz. anhydrous lanolin to ½-pint of paraffin. A friend then introduced me to the beeswax and turpentine solution described by Mr. Barber. It is grand stuff. Incidentally, for a quick job, a rub of Johnson's floor polish is excellent. All these preparations, however, are, in my opinion, a makeshift. To stop the cause of sweating is a difficult undertaking but I have recently carried out some experiments in heating my workshop with considerable success.

Many council houses have a set of outhouses consisting of a coal cellar, w.c., and a tool-shed or wash-house. My workshop consists of the latter. It is 7 ft. 6 in. × 6 ft. 3 in. and 7 ft. high. The roof is flat and like the floor is made in concrete. The walls are 4½-in. brick, very rough inside and rough cast outside. The window is 18 in. square, the top half of which swings outwards. The door opens inwards. This shed sweats badly and is very damp. Gas supply is laid on, and is good enough for heavy brazing up to 100 cu. ft. per hour. Various types of gas fires have been tried without success, as the products of combustion recondense and cause sweating of the tools. I do not like electric fires, as they make the atmosphere here too dry and stuffy.

The only way I know to combat sweating is to keep the place warm and ventilated 24 hours a day. If the temperature varies very slowly and ventilation is kept under control, sweating troubles due to atmospheric changes will be largely overcome. Electric fires are difficult because they are usually full on or off with no in-between range. I am referring to the small portable type of fire. Gas and oil burners are easily controlled, as the heat output can be varied considerably but they *must* be fitted with a flue to carry away the products of combustion.

If a metal flue is used and carried straight up through the roof a considerable amount of heat will be radiated into the shop. If the flue is carried up the outside of shed this heat will be lost; also, if it is too big in diameter, a lot of heat will be lost up it.

As I am away from home from Monday to Friday, I found that using portable gas fires was a bit expensive with gas at 6s. per 1,000 cu. ft., the calorific value of the gas being 410 C.V. The average small portable fire burns from 5 to 10 cu. ft. of gas per hour; at the lower figure this meant a consumption of 120 cu. ft. per day or approximately 1,000 cu. ft. in 8½ days. Actually, by fitting a smaller jet and altering the venturi tube, I cut consumption down to 1½ cu. ft. per hour. This meant that from 6s. every 8½ days I now paid 6s. per month, a considerable improvement. When the shop was opened at the end of a week, the atmosphere was still very heavy and sweating badly.

Various alterations to these fires taught me that a very small flue, a very small flame, and a small amount of ventilating air was sufficient to maintain the temperature in the shed, stop sweating and keep the atmosphere sweet. The heater shown in the sketch is the final result of my experiments. It will maintain a temperature of from 10-20 deg. F. above the outside temperature from one week-end to the next. The consumption is very low and is a maximum of 1 cu. ft. per hour or 40 days continuous burning for 6s.

The burner burns well from 1/5 cu. ft. per hour up to its maximum of 1 cu. ft. per hour. I find the lower value sufficient while the shed is shut up, and the higher value when the shop is being used at week-ends, when the door is being opened and closed a lot, will maintain a comfortable temperature.

A small shop can become overheated by the heat radiated from one person, especially if the occupant is working hard!

The dimensions given on the drawing are not important and can be varied considerably to suit material and local conditions.

Part No. 1.—Heating Tube (1 off, copper)

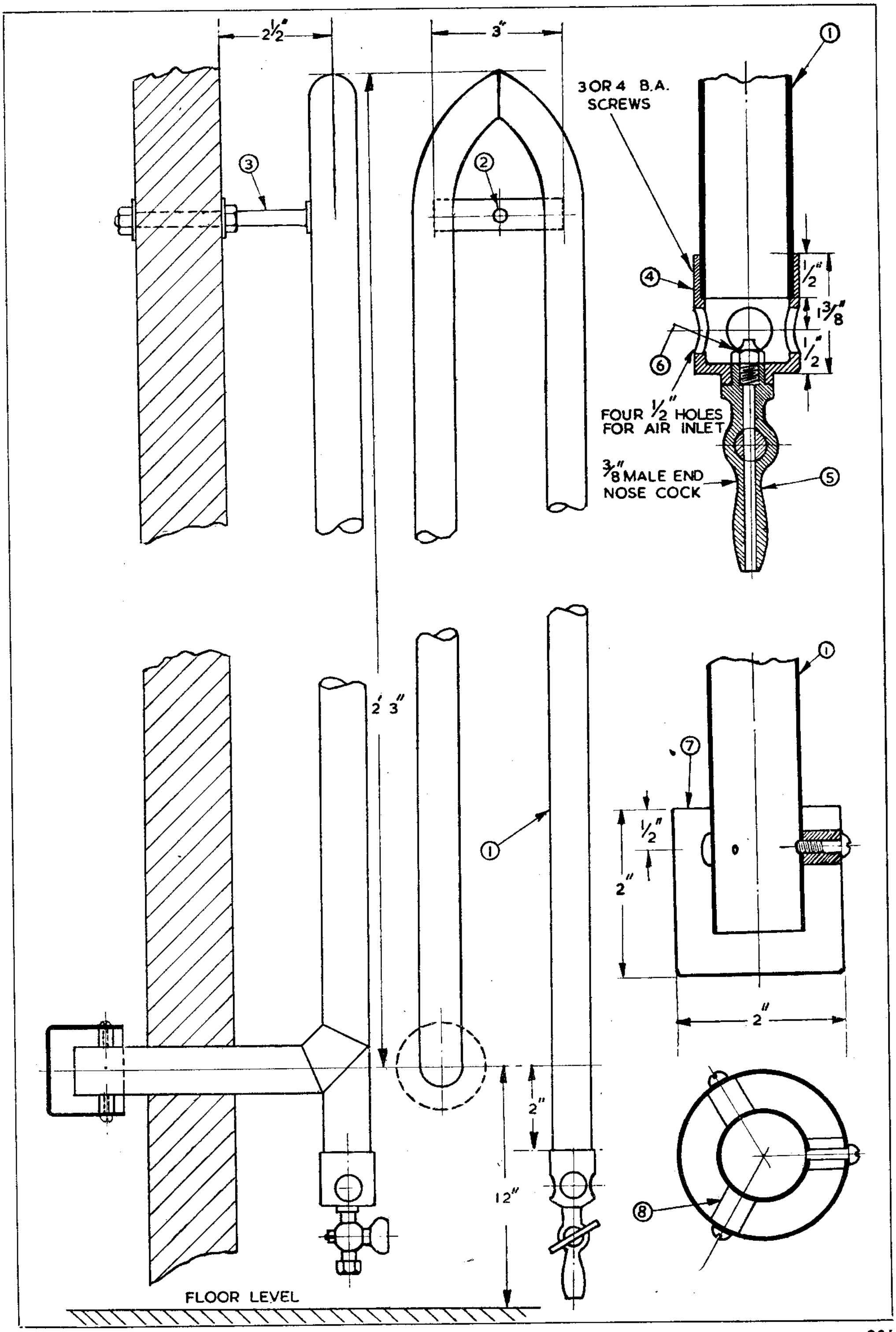
The heater consists of a length of 1 in. × 19-gauge copper tube, made up as shown. The tube can be made in one piece and the bends formed by a pipe bending machine. Most plumbers would bend up a tube easily enough. It only takes a few minutes. The radius is 4 in. on most benders. As I wanted to save on wall space I made mine in short lengths brazed up as shown.

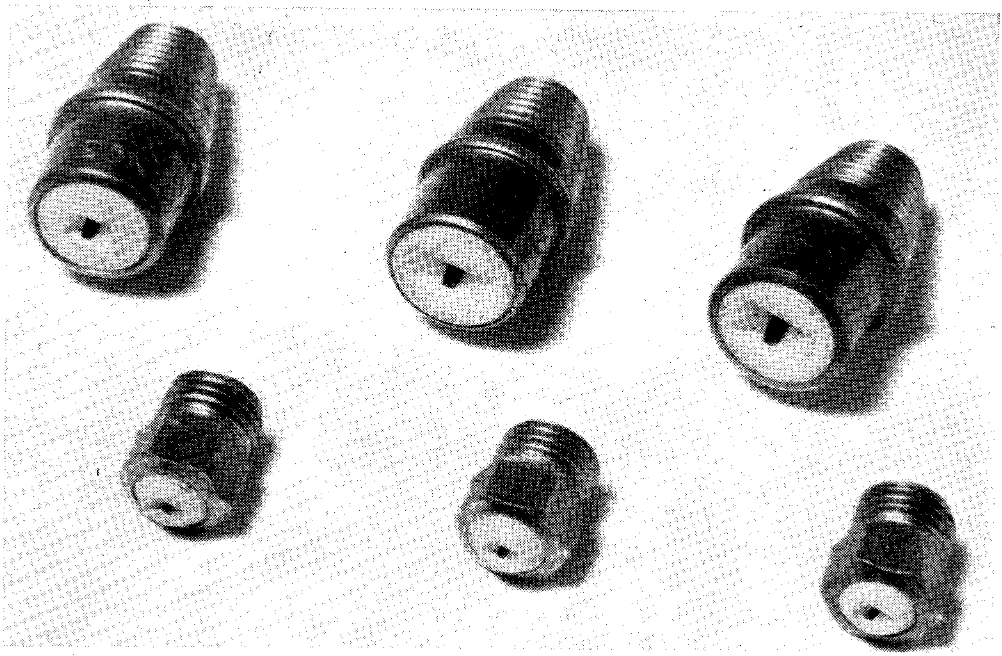
Part No. 2.—Carrying Stay. (1 off, brass)

This is a short length of brass bar brazed across the legs at top, and is used to support the heater on the wall.

Part No. 3.—Wall Bracket (1 off)

This must be made to suit type of wall. If the shed is wood, a length of screwed rod with nuts and washers back and front can be used. If it is a brick wall, split the bolt, open up the ends, and pick out a joint between two bricks and cement in the bolt. A 1⅛ in. diameter hole must be punched in the wall to receive the heater tube. This end of tube does not get very hot and will not damage a wooden wall.


2½"
3"
①
3OR 4 B.A.
SCREWS
③
②
④
½"
1⅜"
⑥
½"
FOUR ½" HOLES
FOR AIR INLET
⅜" MALE END
NOSE COCK
⑤
2' 3"
①
⑦
½"
2"
2"
2"
12"
⑧
FLOOR LEVEL



Part No. 4.—Burner. (1 off, brass)

This can be turned in the lathe. The four $\frac{1}{2}$ in. diameter holes are for ventilating purposes and should not be fitted with a revolving sleeve, as in a bunsen burner. The hole to carry the cock part, No. 5, should be drilled and tapped to suit the type of cock used. A visit to your local gas fitters will produce a brass nose cock for a flexible connection, or to be preferred a union cock for a brass or copper pipe connection. A $\frac{3}{8}$ in. supply pipe is quite big enough.

The hole on the male end of the cock may have to be bushed to receive the nipple, but some makes of cock can be bored out and tapped directly to receive the nipple.

Part No. 6.—The Nipple

The nipple is one of Messrs. Bray's neat flame burners. These nipples are available in various sizes and thread diameters. The ones I used are screwed $\frac{1}{4}$ in. $\times$ 26 t.p.i. The nipples are numbered, I believe, from 1-6. The numbers referring to the number of cu. ft. per hour used. These burners give a flat flame and the flame should not be allowed to touch the side of the tube, otherwise soot will be formed in the tube. These burners are not bunsen burners but burn the gas neat without it being mixed with air in a venturi tube.

Part No. 7.—The Cowl. (1 off, copper)

A simple type of cowl is fitted to prevent back draughts and it appears to work very well. The casing can be built up or spun out of a piece of 20-gauge copper plate.

The end of cowl should be about $\frac{1}{2}$ in. away from the wall.

It is attached to the pipe by three 4-B.A. screws, and brass distance-pieces.

Part No. 8

Made from $\frac{3}{8}$ in. brass rod ; used to hold the cowl in central position over the pipe.

This heater is not meant for the person who wants a cold workshop warmed up in a few minutes, but if a 3 ft. per hour jet is fitted it will give out a lot of heat. Some sooting of the tube will be noticed, and the tube will get red-hot for 1 ft. at least, so keep it clear of all wooden walls !

Helpful Films

SOUND films giving a preview of resorts for this year's holidays, and peeps behind the scenes in railway works or British industries are available free to clubs, schools and social bodies from the comprehensive film library of British Railways, London Midland Region.

The films, many of them in colour, are loaned with an operator and projector, if required, without charge for a two- to three-hour show and have proved so popular that 2,000 shows have already been seen by nearly 200,000 people.

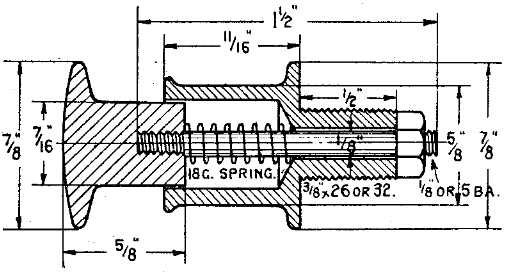
This is an excellent way of providing an evening's entertainment for members of societies, as well as being helpful to people who may be looking for suggestions as to where to spend a holiday. Application for the hire of films should be made to British Railways, London Midland Region, Regional Press Office, Room 400, Euston House, London, N.W.1.

"PAMELA" by "L.B.S.C."

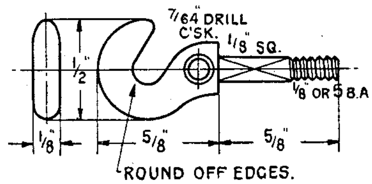
A $3\frac{1}{2}$-in. Gauge Rebuild of a Southern Pacific

It is quite possible that our approved and enterprising advertisers will be able to supply castings for the buffer sockets, but $\frac{7}{8}$ in. round rod (brass or steel) may be used instead; and turning them is merely a kiddy's practice job. Turn and screw the shank first, and part off at $\frac{11}{16}$ in. from the shoulder; then reverse, and rechuck in a tapped bush held in three-jaw, to turn the outside of the socket. Centre, drill right through with No. 30 drill, and open out to $\frac{9}{16}$ in. depth with $\frac{7}{16}$-in. drill. The heads can be turned from a scrap of $\frac{7}{8}$-in. steel shafting or any similar cold-rolled bar. Don't laugh too much, but a friend gave me some nice bits of bright bar some years ago, and when I wanted a bit of steel for *Grosvenor's* buffer heads, I selected a short length of $\frac{7}{8}$ in. diameter from the box, and got busy. Despite a Wimet roughing tool, I thought it seemed confoundedly hard to turn, and I was mighty careful when tapping for the spindles; but the finished heads looked swell, and they were duly fitted. Mentioning this to my friend in a letter, he wrote back "Tell your fairy cleaners they needn't bother about tallowing the buffer heads after scouring—they are rustless!" No wonder the darned stuff was hard to turn!

The spindles are $1\frac{1}{2}$ in. lengths of $\frac{1}{8}$-in. round steel, screwed into the heads as shown, and furnished with ordinary commercial nuts, which should be a tight fit on the threads, so that they won't work loose and come adrift when the engine is at work. The springs are wound up from 18-gauge tinned steel wire, around a $\frac{1}{8}$ in. mandrel, and should just start to compress when the stem of the buffer head is entering the socket. Tip for beginners: to test if the springs are of equal strength, hold the sockets of the assembled buffers in your fingers, and press their heads together. If both heads move back into the sockets equally, the springs are O.K. If not, the one that moves the most, has the weaker spring. To erect buffers, poke the screwed shanks through the holes in the beam, and secure with nuts made from $\frac{1}{2}$-in. hexagon brass or steel rod, or commercial $\frac{5}{16}$ in. nuts drilled out and retapped to suit buffers.



Engine buffer



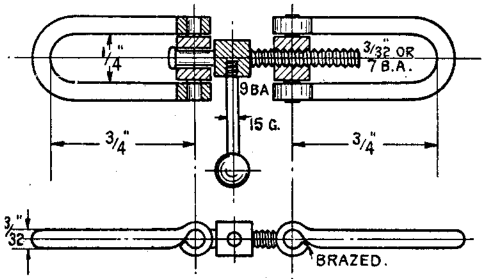
The drawhook

The drawhook is filed up from any odd bit of $\frac{1}{8}$-in. steel plate, such as a cutting left over from the frames; no detailed instructions are needed for a simple job like that. I might remind all and sundry, that the sharp edges of the hook should be nicely rounded off, so that they cannot cut the coupling links and shackles, when coupled up; a point I have seen neglected on very expensive commercial and professional jobs. Also countersink the hole where the shackle goes through.

Screw couplings are fiddling things to make, yet they put the finishing touch on the buffer beam. However, the job is easy, if small. The shackles are only bits of 3/32-in. round steel bent to shape; the eyes are formed by filing away half the diameter at each end, bending into a loop with a small pair of round-nose pliers, and then brazing. Don't forget to poke one shackle through the hole in the drawhook before bending the eyes, or you won't get it through afterwards! The old blacksmith at Brighton Works, in my time, was a nugget at forging the eyes on engine coupling shackles with the latter in place in the hook. It doesn't matter a Continental if the eyes get blocked up when brazing; just put a No. 40 drill through.

The swivels are turned from $\frac{1}{2}$-in. lengths of $\frac{3}{16}$-in. round steel rod, reduced at each end to 3/32 in. diameter to fit the eyes in the shackles. Both are drilled No. 48, and the loose one tapped 3/32 in. or 7 B.A. The shackles are easily sprung over the swivels, by the aid of a little judicious wangling. The screw is also turned from $\frac{3}{16}$-in. rod. One end is turned down and screwed to match the tapped swivel; the other to an easy fit in the plain swivel. Push it through, and rivet over just sufficiently to allow the screw to turn easily. The turning apparatus consists of a $\frac{5}{8}$-in. length of 15-gauge spoke wire screwed 9-B.A. at both ends; screw a turned ball about $\frac{3}{16}$ in. diameter on one end, and screw the other into the enlarged centre part of the screw. It doesn't matter about the ball being true, as the full-sized ones are just stampings, and usually have flats on both sides. In passing, several followers of these notes who were highly amused at the

idea of the all-female *Golden Arrow*, wondered how even an *ex*-athlete like Fireman Alice, managed to throw the heavy coupling on to the hook, and screw it up. She did nothing of the sort, as both *Lady Vera* and the Pullman cars had automatic couplers! By 1983 there shouldn't be anything so antiquated as screw or link couplings, though side buffers could be retained with advantage, as they keep the couplings tight, preventing the snatch and jerk which I experienced on American trains. All Alice had to do, was to couple up the brake pipe, train-heating pipe, and the jumper carrying the alarm and telephone wires; sing out "Right, Joy!" and watch the pipe couplings as Joy made a brake application, and then pulled the handle of her driver's brake valve around to release position. After which, with a pleasant smile and a grateful "Thank you very much," Alice grasped the hand of a young fellow who gallantly assisted her up to the platform. It's easy when you know how!! Some of our readers—and their wives and daughters—say they would like to meet Driver Joy, Fireman Alice, and Guards Gert and Daisy on another run; well, it seems as though I'll have to take another look into the crystal!



Details of the screw coupling

When fitting the coupling-and-hook assembly to the buffer-beam, put a spring similar to those in the buffers, over the shank of the drawhook, and secure it by a commercial nut and washer. On the old L.B. & S.C.R. we used to hang the loose shackle on the hook when not in use, to prevent it swinging about.

The drawing of the brake pipe stand explains itself. As this is a suggested rebuild of existing engines with vacuum brake gear, the pipe is a replica of the usual vacuum brake fitting; otherwise I should specify the type used for the air brake. In certain country districts, the former brake is known as the "wackum," but in the opinion of your humble servant, and many other enginemen both in this country, U.S.A., and Canada, the Westinghouse quick-acting air brake is the one to whack 'em! Nothing else would do for the quick stops essential on the London Underground and the Southern Electric. The brake pipe stand shown, is made from $\frac{1}{8}$-in. copper wire, the hose being a piece of rubber tube; cycle valve tubing would do, if nothing else is available. The dolly, or dummy plug, is a weeny edition of that relic of Victorian nurseries, a baby's soothing teat, turned from a bit of $\frac{1}{4}$-in. brass rod. The part below the flange is filed flat on both sides, and pivoted between the ends of a small clip bent around the pipe; the end of the hose is slipped over the teat, and a dummy coupling simulated by bending a little strip of thin metal around it. The complete gadget is secured to the buffer beam, to the left of the coupling if you look straight at it, by a small half-round pipe clip bent up from a strip about 5/32 in. wide, and fixed by a couple of $\frac{1}{16}$-in. or 10-B.A. screws.

Chime Whistle

Some of the builders of *Pamela* want her to be able to "whoo" like *Lady Vera* and her sisters of the days to come; so here is an easy way to do it. *Annabel*, the 2-6-6-4 Mallet, does it beautifully by means of two whistles with harmonising tones; but they are located under the running boards at either side, and in cold weather the "whoo" sounds a bit watery until they are warmed up by the steam. As *Pamela* has a fixed ashpan, the whistles can be attached to it, one at either side, and the steam pipes connected by a tee, as shown in the diagram. The whistles will keep warm and dry, and should produce the required "whoo" as soon as the handle of the valve is touched.

The whistles are generally similar to those I have previously described in these notes, also in the *Live Steam Book*, being made from thin brass tube; but in this instance, the single arch-shaped slot is replaced by two rectangular slots, same as in the scout, guide, police and referee whistles. The best type of whistle that I know of, is the correct locomotive bell whistle (our cousins over the pond call it a peanut whistle) in which a bell is installed over an annular steam slot, and you get a musical note; the old Brighton, Midland, and similar whistles had a deep mellow note that carried for miles, but did not offend the ear. I have reproduced these whistles in the small size; but to get a deep note, it requires a tube, and it doesn't take much to knock the tube out of alignment with the annular slot, and then all you get is either a husky moan or a hiss. The double rectangular slot is the next best thing, as the tube cannot get out of line with the steam openings.

Make both the whistle tubes the same size for the kick-off, using $\frac{1}{2}$-in. brass treblet tube, or failing that, ordinary thin brass or copper tube of same diameter. Square off both ends of one in the lathe, to 5 in. length, and one end of the other; plug one end of the first one, as shown, by a drive-fit plug turned from $\frac{1}{2}$-in. brass rod. The slots are filed as shown; they must be exactly opposite, so chuck the tubes in the three-jaw, and with a pointed tool, make scratches right around each tube at the location of the slots. These are then filed between the scratches. Turn up the $\frac{1}{2}$-in rod for about $\frac{1}{2}$-in. length, to a tight fit in the tubes; then part off two $\frac{1}{8}$-in. slices, and file 1/64-in. recesses in each, to correspond with the whistle slots, as shown in the illustration. Drive these into the tubes until level with the slots. The ends are closed by turned plugs as shown, with the ends formed as $\frac{1}{4}$ in. $\times$ 40 union screws, which every follower of these notes should be able to make without further detailing.

Try the whistle with the plugged front end,

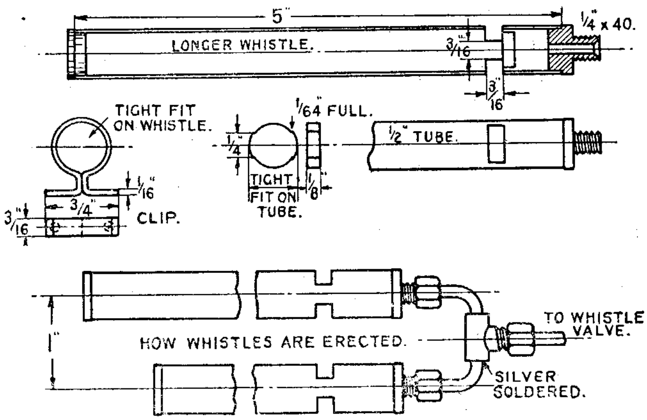
by air pressure, with a tyre pump. It should blow a clear note at 60 lb. pressure. If it doesn't, try adjusting the disc back and forth ; and if that fails to work the oracle, make the slots 1/64 in. or so wider. Ditto repeato operations on the other whistle, but put a cork in the open end ; and when you get it to blow a clear note at 60 lb., gradually push the cork down the tube, raising the pitch of the note, until it is two tones higher than the other one, and harmonises with it perfectly. Note exactly where the end of the cork comes, then cut off the whistle tube about $\frac{1}{8}$ in. or so above it, and replace the cork by a turned brass plug. The end plugs may be soldered in, if they are at all slack ; and the discs can also be sealed, if a couple of spots of soldering fluid are applied, plus a very small bead of solder, and the whistle held over a gas or spirit flame until the solder melts. Be careful not to let any solder run into the steam openings.

The whistles are attached to the underside of the ashpan, by clips made from strip metal as shown ; they should incline slightly downwards towards the back of the engine, so that any condensate water can drain out. The union connections are shown in the diagram, two short pipes with union nuts and cones being connected to the cross part of a tee, the stem of which is connected to the pipe leading from the union on the turret, or whistle valve. When the handle is depressed, both whistles sound together ; and if properly tuned up as described above, you'll hear an excellent imitation of Curly's signature tune, which puzzled Jack Busby & Co. in the story.

Accessories

Apart from brake gear, which —all being well—I shall describe in a subsequent instalment, we only need a few odd trimmings to finish off the engine part. Superfluous nobs and excrescences, as beloved by the " full-detail " specialists, are an absolute pest on any little engine intended for real hard work. When lamp irons, for example, are not engaged in knocking bits of skin off your hands, they get knocked off themselves (poetic justice ?) and extra handrails and grab irons don't add much to the appearance of the engine, when they become bent and twisted—though nowadays, big ones are often like that ! Same applies to front end steps. Anyway, I have shown the minimum of adornments necessary to impart that touch of realism which is characteristic of all your humble servant's efforts. One of the " big " engineering journals recently paid me a compliment in that respect, for which I bow gratefully. Steps up to the cab are needed, and these are shown in one of the detail illustrations. The step support is cut from 16-gauge steel sheet, to the shape and dimension shown ; and when bent on the dotted line as indicated, the support is rigid enough to withstand all the bending stress it is likely to get with fair usage. Don't forget to bend one right- and one left-handed. The steps themselves are made from angle, bent up from odd scraps of the self-material, and riveted on with pins, or alternatively they can be brazed. If desired, the bottom of the support itself may be extended downwards for $\frac{3}{8}$ in., and then bent outwards at right-angles, to form the bottom step, instead of attaching a separate one.

The steps are erected with the top part inside the valance, and the bent-over back butting up against the drag beam, to which it is attached by a couple of 3/32-in. or 7-B.A. screws and nuts. A couple of countersunk screws can also be put through the valance, and the top of the step support, and nutted on the inside ; or a strip of 16-gauge metal could be soldered to the back of the step support, close to the top, and the double thickness of step support and strip, drilled and tapped to take the screws. Incidentally, I just hate fiddling about with loose nuts ; if I drop one, it usually disappears down a crack between the floorboards. I'd never be surprised to see a mouse in our kitchen, holding a couple of $\frac{1}{16}$-in. nuts in its tiny paw, and taking



Chime whistles

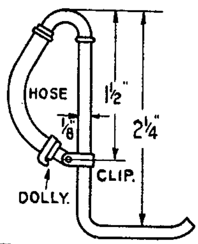
a look around the mousetrap to see where they belonged !

It is hardly worth while taking the trouble to make the little knobs for supporting the handrail around the boiler, as our approved advertisers can supply them at a quite reasonable price ; at time of writing, anyway ! However, if you so desire, they can be turned from $\frac{3}{16}$-in. nickel-bronze rod. Turn and screw the shank first, in the ordinary way ; the stem and knob can then be formed with a special tool, as shown, easily made from the end of an old flat file that has outlived its original term of usefulness. To drill the knobs truly, make a jig ; only a few minutes' work. Drill a hole big enough to take the knob, in the end of a bit of square bar, then drill a cross hole, so that when the knob is placed in the end, the drill, if poked down the cross hole, goes slap through the middle of it. This is far easier and quicker than setting each one up on an angle-plate, a method I once saw seriously advocated.

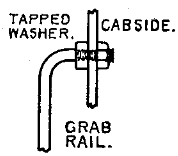
The location of the knobs is easily settled by

standing the engine on something level, and scribing a line along the boiler at each side, with a scribing block or surface gauge. It should be about $\frac{5}{8}$ in. above centre-line. Put two knobs in the firebox shell, three in the barrel, and two in the smokebox ; the spacing is indicated in the general arrangement drawing of the engine first published, and in the blueprints. Drill No. 51, tap 8 B.A., and screw the knobs in with a taste of plumbers' jointing on the threads. Also, put one knob in, over the smokebox door.

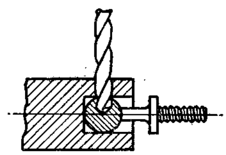
The handrails themselves, can be made from 13-gauge wire, nickel bronze, or rustless steel, or even tinned iron wire will do. The smokebox end of the handrail at each side, is bent to the curve of the smokebox, and the joint made by scarfing the ends—that is, filing them off at an angle—and making both ends meet in the top knob. If they try to slip out, a judicious application of a soldering bit will teach them better manners, and the solder is easily melted if the handrails should need removing at any time. The cab handrails, or grab irons as the enginemen call them, are made from similar material, and attached to the cab as shown. Bend over the ends, screw them, put a tapped washer on, poke the screwed ends through suitably-drilled holes in the cab sheet, and secure with nuts.

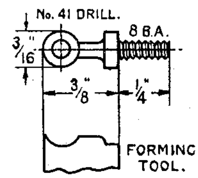


Brake pipe



How to fix cab handrail


How to drill handrail knobs



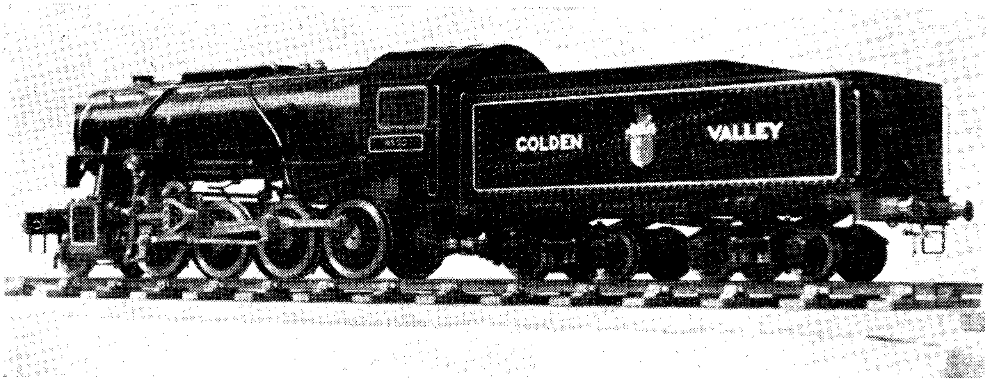
Forming handrail knobs

No lagging is needed on the boiler barrel, but a sheet of thin copper or brass may be put over the firebox to hide up the stayheads, and is secured by $\frac{1}{16}$-in. screws at the bottom. The boiler bands can be made from thin brass strip, about $\frac{3}{16}$ in. wide (sold commercially under the name of "ticket wire") the ends of each band being bent at right-angles, drilled No. 48 and secured by 9-B.A. screws and nuts. As the top of the firebox wrapper looks a bit "Mother Hubbard's cupboardish," the monotony may be relieved by a weeny dummy tube-type chime whistle, lying flat, as shown in the general arrangement drawing.

One of the few good points about the full-sized spam cans, is the electric lighting ; why on earth locomotive engineers never took a hint from automobile practice, is one thing I never could understand. Old Billy Stroudley was the first to put continuous electric alarm signals in all the Brighton trains, ditto electric lighting in the coaches, and I'll bet, if he had lived, it would soon have been applied to the route indication and gauge lamps on the engines. My *Annabel* running in the dark, with the fire lighting up the exhaust steam, and her electric headlight shining down the track ahead, is a sight to gladden tired eyes ; and *Pamela* can easily be made to follow suit, by installing electric lighting. All you need for each lamp, is a $2\frac{1}{2}$-volt torch bulb housed in a short piece of tube just long enough to take it ; no front glass is needed, as the bulb can project from the front of the tube, just enough to allow it to form its own "lens." Only one wire is needed to each lamp, the return being through the metalwork of the engine. Anyway, I won't go into full detail of this now, as the battery would have to go under the tender, and be connected up with a tiny jumper ; but if all's well, will give details of how to fix the lot, switch and all, when describing the tender accessories.

Watch Your Face !

I hasten to assure you that the above heading isn't meant for a soapy joke misprinted, but a solemn warning ; so listen here. On a recent evening it came to pass that I had to drill a $\frac{3}{8}$-in. hole in a bit of mild-steel bar. Although it was *not* peak hour, the mains voltage had dropped so low—as it frequently does, far lower than in the war years—that the flu-tube had given up the ghost altogether, and the 100-watt ordinary lamp alongside it, for emergency use, had the brilliance of a red-hot hairpin. I usually keep my drills in good condition, and the cuttings were coming off nicely, in the usual curls ; but I had to look pretty closely at the job on account of the bad light. Suddenly one of the cuttings became caught up on the drill, whirled around, flew straight out, and before I had a chance to bob clear, it caught me a swipe across the face, cutting my lip and the side of my mouth. Had it caught my eyes, I shouldn't be writing any more live steam notes. The whole incident took place in a fraction of a second ; but it just goes to show how accidents happen, despite ordinary care. Of course, the real cause was the bad light, otherwise my face wouldn't have been close enough for the whirling cutting to catch it ; but as the cuttings were coming off in the manner usually observed when drilling mild-steel, that is in a long curl which lops over to one side and lays on the table, I thought it was safe to take a close look. However, we live and learn—and some lessons are not likely to be forgotten very easily !



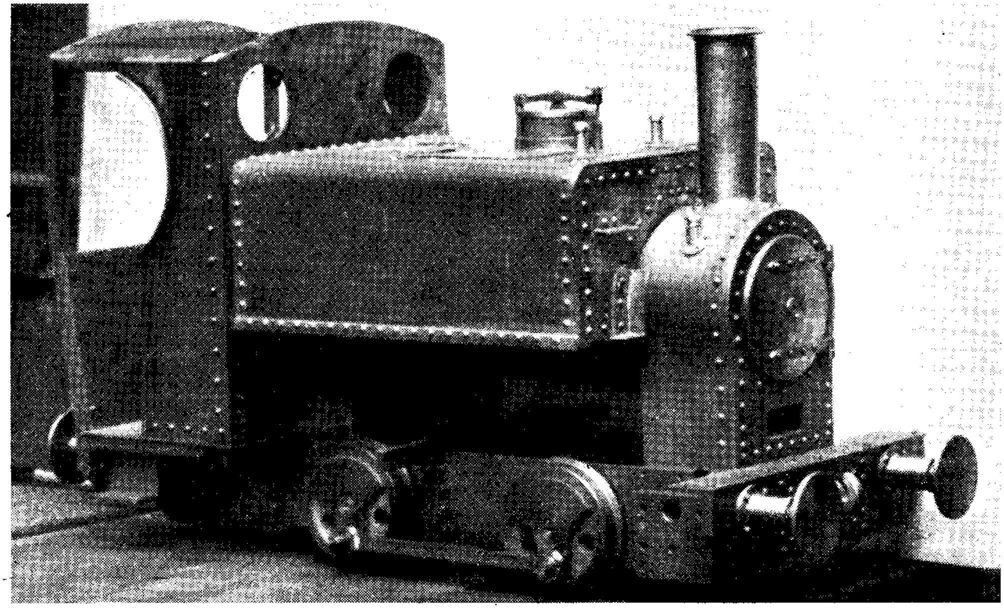
Mr. E. Stephens "hits the bull's-eye" with his first shot

" Starting from Scratch "

Here is another example of the handiwork of readers who start the job absolutely from the zero point. Mr. E. Stephens, of Liverpool, writes to say that like our reverend brother whose ten-year job was recently illustrated, he knew absolutely nothing at all about the building or operation of locomotives ; but by faithfully following my instructions, he built the American type Austerity engine shown in the photograph reproduced here. She is a $2\frac{1}{2}$-in. gauge, and on her very first run hauled a load of three adults, all the flat car would carry, 42 stone in all. She will run ten minutes on one firing, when hauling a single passenger on an 80-ft. up-and-down line, and has actually shifted her builder and two kiddies on 15 lb. pressure—a good testimonial to the doctrine of the big cylinder !

Our worthy friend is now at work on an industrial type of narrow-gauge tank engine, shown in course of construction. She is 5-in. gauge, but is being made from $3\frac{1}{2}$-in. gauge parts, and will have *Hielan' Lassie* cylinders and Baker valve-gear. The boiler is adapted from the *P. V. Baker* design.

Congratulations on your excellent work, brother, and good luck to the saddle-tank. She ought to be a puller !



An " auntie " for " Tich "

IN THE WORKSHOP

by "Duplex"

No. 82—Using the Paint Gun

THE gun, which was described in the last article, is used with air at high pressure; a compressor will, therefore, be necessary, and equipment of the type described in "In the Workshop" on May 18th of last year will be found suitable for the purpose.

The pressure of air employed depends upon the consistency of the paint. If the paint is thick, a high pressure will be needed to atomise it. On the other hand when paint is well thinned, a lower pressure will atomise it perfectly, and work may then be carried out satisfactorily at pressures ranging from 20 to 40 p.s.i.

Many workers make the mistake of using the paint in too thick a state. It is far better to apply a succession of thin coats rather than attempt to finish the work by two or three heavy applications.

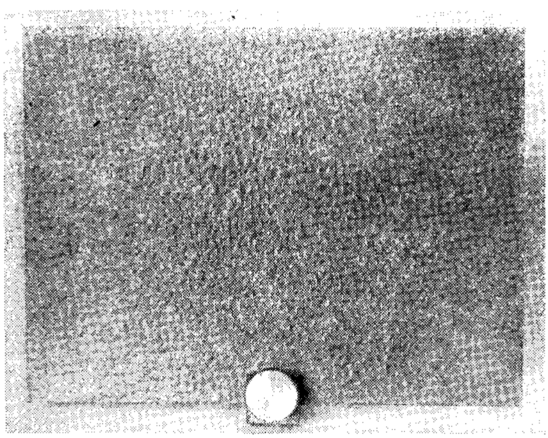


Fig. 1. *An example of orange-peeling*

If cellulose is applied in a thick condition the surface of the work will present an appearance similar to the skin of an orange. This condition is, in fact, known as "orange-peeling," and is very troublesome and tedious to polish; consequently, it is most wasteful of time and energy. The condition is brought about by the paint being insufficiently atomised and even partially dry when it comes in contact with the work. In this state the paint sets in a granular form, as illustrated in Fig. 1, and does not leave a smooth surface.

When using cellulose paint the initial coats should be diluted with the appropriate thinners in the proportion of 50 per cent. thinners, 50 per cent. paint. Finishing coats may be still further diluted, and it is quite common to use a mixture in which only some 25 per cent. is cellulose paint, the remainder being thinners.

The same remarks apply equally to bitumastic paints. We have found that paraffin oil dilutes these pigments well. Naturally, they take longer to dry, but they cover the work more evenly.

Masking the Work

Work which is to receive more than one colour will need to have provision made for preventing the paint being sprayed on surfaces which are to have an alternative pigment. Similarly, the work surfaces which are to remain in an unpainted condition will need to be treated so that the paint cannot adhere to them.

In many instances this masking of the work, as it is called, may be effected by covering the work which is to remain unpainted with a film of motor grease. Then, when the work has been completed, the grease can be wiped away leaving the surface bright. An example which comes to the mind is the painting of the interior metal bodywork of an old Austin Seven car. It was desired to leave the gearbox and clutch casing bright. These parts were, therefore, liberally daubed with grease. The paint gun was then used on the interior of the car. When the paint had dried, a paraffin rag was used to wipe away the grease, and the gearbox and clutch cover were revealed in their natural aluminium without any trace of paint adhering to the surface.

Grease must, however, be used with discretion, for it is soluble in cellulose and other thinners. It will, consequently, not always be possible to achieve a clear cut paint line. To ensure this, masking is best carried out, where practicable, by using adhesive tape or brown paper which is suitably secured to the work. Large surfaces are masked by paper which is taped to the work, the tape being applied round the edges of the paper. A simple example is the method used for masking the window glasses of a motor car when the body is being repainted. The arrangement is shown in Fig. 2.

It will be seen that, as shown by the dotted line, the paper is not cut to the full size of the glass, but an allowance is left so that the adhesive tape itself may be attached to the glass with the edge of the tape against the rim of the window. In this way no paint can fall on the glass, though it will be possible to paint right up to the edge of it.

Mounting Work for Painting

Wherever possible, work should be suspended in a suitable manner so that it can be turned as painting proceeds. Alternatively, as illustrated in Figs. 3 and 4, small parts can be placed on a simple turntable so that work can rotate.

A suitable device for small work can be made from a pair of aluminium castings. These are machined, as shown in the illustration, to take an old ball-race. One casting then forms the table whilst the other serves as a base for the device.

If desired a pair of chuck backplate castings may be used or two light aluminium castings of the type illustrated in Fig. 5 may be employed with advantage.

A turntable for large work may be contrived from an old flywheel mounted on a spigot which is set in a suitable flange. The flange is then screwed to a bench and a wooden top is made and fitted to the wheel so as to afford a level footing for the work. The arrangement is illustrated in Fig. 6.

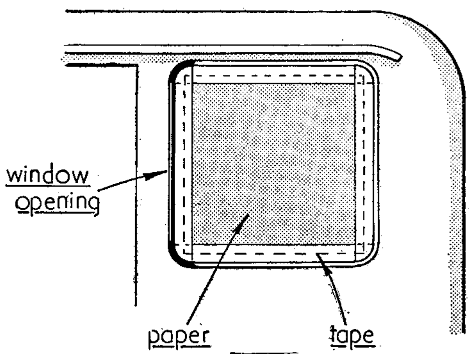


Fig. 2. Masking a car window

Atmospheric Conditions Suitable for Painting

It is useless to spray cellulose paints in a damp atmosphere, for the colour will bloom, a term which should be sufficiently explanatory in itself, and it will be a difficult, if not an impossible matter to obtain a satisfactory finish. Blooming can be easily recognised by the foggy appearance which the work assumes. A black paint which has bloomed presents a bluish appearance ; the condition is, therefore, easily distinguished.

The air in the shop where painting is carried out should be warm and dry, and preferably at a temperature of some 60 deg. F.

Adjusting the Pressure of the Air Supply

Before the gun is filled with paint and brought into use, it will be necessary to adjust the air pressure. In commercial outfits a special air delivery fixture embodying a reducing valve and a moisture trap is supplied. The simple equipment to which reference has, earlier, been made, employs a regulator in the form of an adjustable safety-valve which can be set to blow at any required pressure. The air supply cannot rise above the set pressure. It should perhaps be stated that air pressures are only critical if the paint is thick. When the pigment has been well diluted, a good deal of latitude is possible.

A word of warning must be uttered about spraying cellulose paint on surfaces which have previously been treated with oil-bound pigments or with varnish. If this is done, the solvents in the cellulose paint will soften the surface and the old colour will blister, forming unsightly blemishes which will persist even after the paint has dried. The only course, then, is to remove all the old paint and commence operations again.

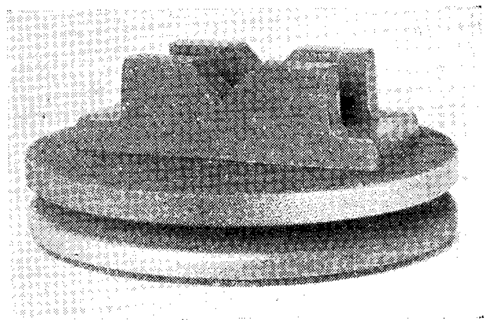


Fig. 3. A light turntable for painting small parts

However, there are sealers on the market which will enable cellulose to be used over oil paints, but, before using them the advice of a reputable paint manufacturer should be sought.

Preparing the Work for Painting

Before any painting is undertaken, it is essential to see that the work is clean and free from grease. New work can be sufficiently cleaned by wiping the surface with a petrol-soaked rag. Old work, on the other hand, should have the paint removed with a chemical stripper. Any rust which is revealed can then be removed by wire brushing or some other suitable method.

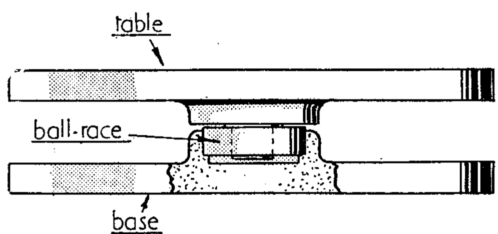


Fig. 4. The light turntable in part section

Applying the Paint

In the first instance it is usually preferable to apply an undercoat to the work, except when a bitumen base paint is used, for this type of paint needs no primer.

The colour should be sprayed evenly over the surface, and care must be taken not to dwell at any one place, or paint runs may form. These will mar the work. So, any that occur must be removed at once by wiping the surface with a clean rag soaked in thinners.

The gun should be held from 6 in. to 9 in. away from the work and the combining cone adjusted until a finely atomised discharge of paint is obtained. It is a mistake to allow the gun to discharge too freely, for this, again, will tend to cause paint runs, and it will be impossible to cover the work evenly.

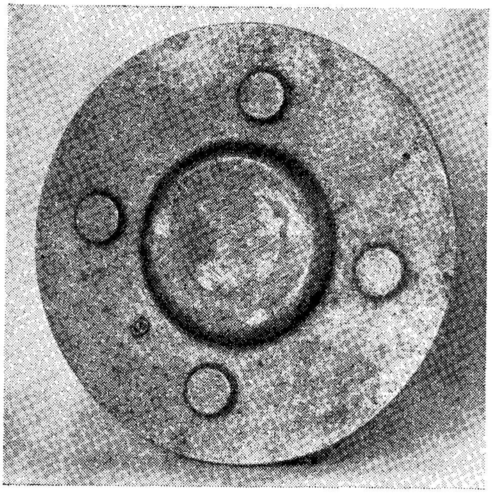


Fig. 5. A suitable casting for making the turntable

When adjusting the gun at the commencement of operations it is advisable to shut off all paint supply by closing the combining cone on to the air nozzle. The cone may then be gradually unscrewed until the spray issuing from the gun is seen to be satisfactory.

If distemper or Snowcem is to be sprayed, the filter at the base of the paint tube must be removed, otherwise it will not be possible to draw the fluid from the container. In passing, it should be noted that both distemper and Snowcem, particularly the latter, have an abrasive action upon the combining cone. It is advisable, therefore, to make a steel cone and air nozzle to replace the brass components, if much work with either of the compounds mentioned above is contemplated.

Painting Wire Wheels

The painting of road wheels is an operation often performed by those who carry out their own motor car repairs and maintenance. Hand painting wheels is, by any standard, a tedious matter; moreover, the finish obtained in this way cannot compare with that which results from spraying.

It may, therefore, be of some help to describe the methods which we use with complete success.

The wheels must be thoroughly washed and all the old paint cleaned away by means of a chemical paint stripper. It is not absolutely necessary to remove the tyres and tubes, though this is advisable if the wheels are old and there is likely to be rust on the inside of the rims. Experience has shown that, although some makes of paint stripper are exceedingly powerful in action, it may need more than one application to remove all the old colour. We have recently had occasion to treat some wheels that were heavily encrusted with paints of many types and colours, and three applications of stripper were needed to remove all the old paint.

The stripper is applied with a brush and the work is then allowed to remain for half-an-hour or so until it is seen that the old paint presents an appearance akin to that of a rubber sponge. The wheel is then hosed with a powerful jet of water and, at the same time, scrubbed vigorously with a wire brush.

When all the old paint is seen to have been removed the wheel is carefully dried, preferably with a chamois leather, and may then be painted, using, first, an undercoat which is followed by two or more coats of the required colour.

The spraying of each wheel separately is not advised, as, to do so, much paint would be wasted. Accordingly, the wheels are stacked one behind the other leaning against a door, or, if the work is placed on a bench, against the paintshop wall, which should be protected by paper or in some other manner that allows the protective covering to be easily removed once the painting has been completed.

The wheel nearest to the gun is then sprayed, first on one side and then upon the other, after which it is changed and put at the back of the stack. The wheel uncovered by the change is now, painted in its turn and subsequently placed behind all the others. The process is then repeated until all the wheels have been sprayed. In this way any paint which misses the work nearest to the gun will fall on the wheels lying behind, thus greatly minimising the paint loss which would otherwise occur. The method is shown in Fig. 7.

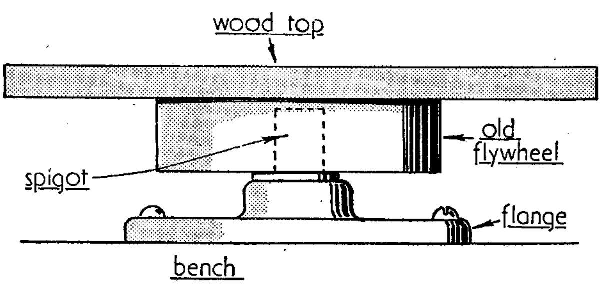


Fig. 6

Cleaning the Gun after Painting

As soon as any painting operations have been completed, the gun must be cleaned, particularly when cellulose paints have been used. Accordingly, any paint left over should be emptied from the container and replaced in the stock tin. The

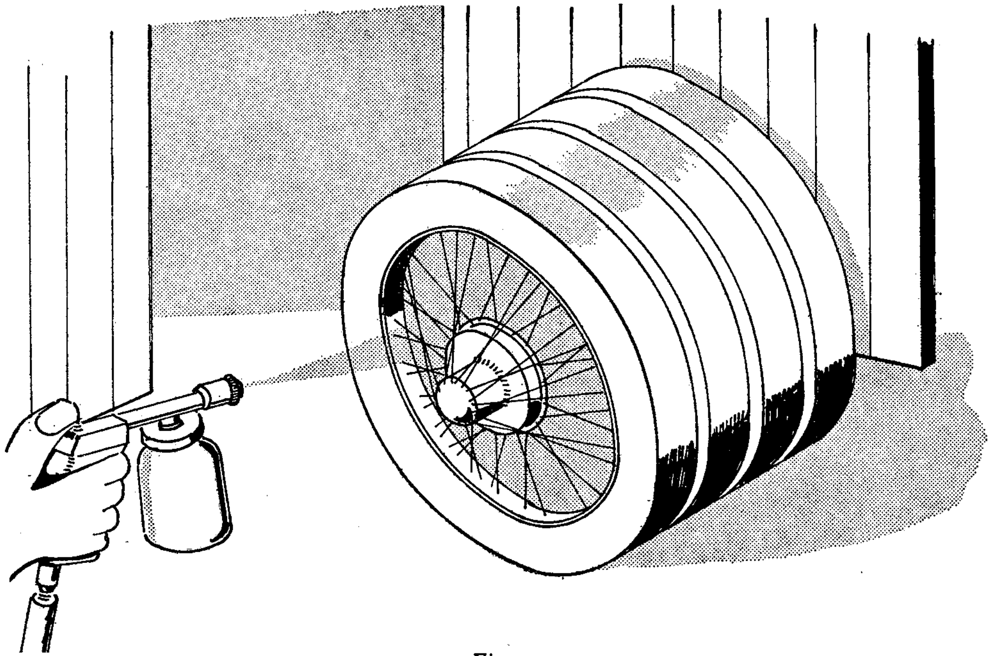


Fig. 7

container should then be washed out with thinners. To clean the gun itself, a small quantity of thinners is first poured into the paint container and blown through the gun by reconnecting the latter to the air line and using it in a series of long bursts. As cellulose thinners are somewhat expensive, they should not be wasted. Accordingly, any material used for washing out the container and the residue after blowing down the gun may well be put into the bulk paint stock. In this way the amount of solvent needed to thin the paint subsequently will be much reduced. As the thinners needed for cleaning will, to a greater or lesser extent, be discoloured, it is obvious that they should only be put into paint of the same colour.

After the gun has been blown down, it must be dismantled and all parts wiped dry with a clean rag. Failure to do this can easily result in difficulty when it is next desired to withdraw the air tube from the body. Moreover, it may well be found, when the time comes to use the gun again, that the combining cone is immovable.

Air Hose

It may not be out of place to repeat some remarks on the subject of air hose which were published in an article entitled " Compressed Air for the Workshop " to which reference has been made earlier in these notes.

The hose should be as light as possible consistent with adequate mechanical strength. Tubing sold for tyre pumps is excellent for the purpose, as it will not kink easily and is well able to withstand the wear and tear occasioned by dragging over the ground. When household redecoration is undertaken, it often happens that the location of the work results in practically the whole of the weight of the air line being taken by the operator. Sometimes the hose can be hooked to some convenient projection so as to relieve him of much of this weight, more often this is not possible. It will readily be appreciated that under these circumstances the lighter the hose is the better.

The bore of the tube should not be less than $\frac{1}{8}$-in. diameter or the paint gun may be starved of air. The unions at each end of the line should be well secured by a neat hose-clip, a suitable example being illustrated in Fig. 8.

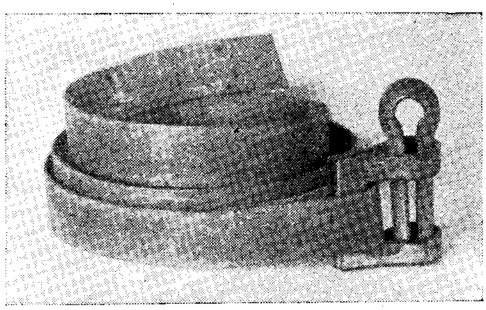


Fig. 8. *A suitable clip for light air-hose*

These clips, which are made in a variety of sizes, consist of a length of zinc-coated metal strip which has one end bent round a pressed metal buckle ; through the two eyes of this part a split pin is passed.

To use the device, one complete turn of the strip is first taken round the hose, the end is then passed through the buckle *under* the split pin

and the strip is then taken once more round the hose and finally tucked into the slit in the split pin.

The strip is, next, pulled tight by hand, using a pair of pliers for the purpose. Any surplus is then cut off leaving a short length of strip protruding through the side of the split pin. The short end of the strip is bent round the pin and a punch or a nail is used to turn the split pin in the manner of a windlass, thus tightening the clip. The method of using this form of hose clip is illustrated in Fig. 9.

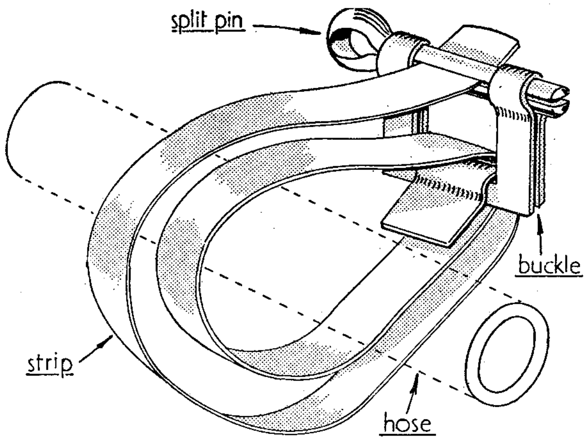


Fig. 9. Method of fitting the hose clip

Note on the Hacksaw Machine

We notice that Mr. E. T. Westbury has recently issued a warning to readers against buying castings from sources unauthorised by the designer. With this advice we entirely agree, and, to save readers possible dissatisfaction and disappointment, we would point out that the castings and materials for the hacksaw machine designed by us are supplied by Mr. W. H. Haselgrove, of Petts Wood, Kent, and these are in accordance with our specifications.

Clock Dial Illumination

I SUBMIT herewith an idea which I incorporated in a home-made clock in 1940

It can be applied where normally a rise-and-fall cam with ratio gearing would be used.

In my application, I desired to switch the clock dial illumination lights on and off at 8 p.m. and a.m. respectively.

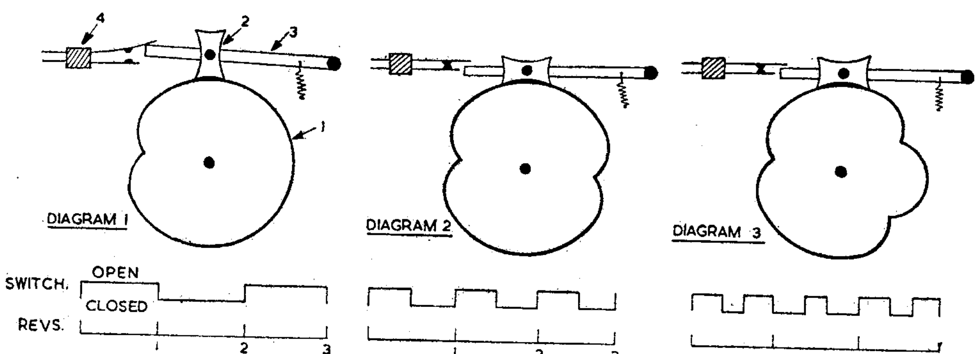
The disc (1) was fitted direct on to the hour hand tube and thus revolves once in 12 hours. The four-sided block (2) was pivoted on an arm (3) which in turn operated the switch (or in my case leaf contacts (4). As the effective sides of the block are alternately high and low relative to the pivotal centre, the arm is raised and lowered at alternate revolutions of the disc. This will switch on for 12 hours, off for 12 hours, on for 12 hours, etc., eliminating the 2-to-1 gearing with stepped cam.

Diagram 2 shows the same system modified to give a 4-to-1 action in 24 hours, and the addition of pairs of equally spaced notches gives further multiples.

An odd number of notches (especially if unequally spaced) gives complementary actions. (Diagram 3.)

By varying the number of sides on the block, still further combinations can be obtained.

A little thought will show other applications of this idea, alarms that do not go off in the evening, being one.—A. E. WINNETT.



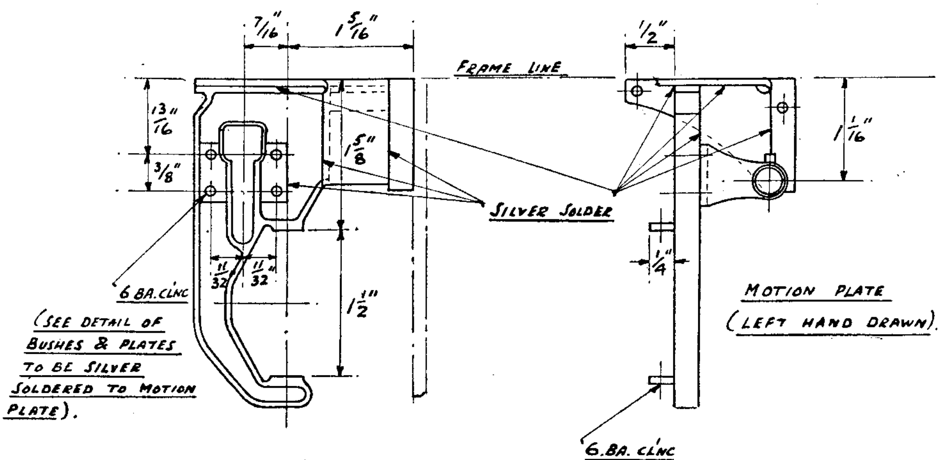
*TWIN SISTERS

by J. I. Austen-Walton

Two 5-in. gauge locomotives, exactly alike externally, but very different internally

THE motion-plate and, more particularly, its method of attachment to the frames, is one of the most tricky parts of the whole engine. It so happens that the frame of the motion-plate well overhangs the trailing wheel, leaving little more than an odd $\frac{1}{4}$ in. of frame at the back and above the wheel, to which the frame may be bolted. Fowler, when he designed the engine, had to face the same problem, and cleverly he evolved a plate with a box section extending backwards in order to reach a free portion of frame, where bolting up could be effected without too much trouble.

Eventually, I arrived at the solution shown on the drawings, and from the appearance angle the difference is hardly noticeable ; I doubt if even the expert could detect any difference, unless he had done work on the component in question in the L.M.S. Works at Crewe. I contend also that the altered type is, if anything, stronger than the first version, and as we are dealing with problems centred round scale strengths, we can well do with the extra stiffness gained.



I examined this motion-plate, as shown on the original drawings, and very soon saw that I was going to be up against it in a big way. To start with, it was an elaborate steel casting, making use of quite a number of difficult cores, which would have been even more tricky, when carried out in small scale. The actual frame of the plate was of obvious form and outline, and I prepared a neat pattern and castings for this, embodying the full-size beaded edge practice in all the surrounds to the apertures and outside edges.

I then fabricated the remaining parts, silver-soldering them together, using silver-solders of varying melting points to prevent made joints coming apart during successive heatings ; when these components were cleaned up and painted, they might have been exact replicas of the original parts—but I wasn't happy. I knew that there would be many folk who would be scared at the thought of going to so much trouble (with the probable risk of failure—at least, the first time) so another method had to be sought.

*Continued from page 147, " M.E.," January 25, 1951.

This new set comprises three parts : the cast frame, a backplate, and a sheet-metal part, bent up to form a three-sided box structure. In order to avoid a multiplicity of castings, the frame is supplied suitable for both left and right-hand fittings, and the lugs that carry the ends of the guide bars, extend both ways ; just saw off the parts not required, noting that the lugs face forward to the cylinders. There are also pads or faces with bossed fixing holes for the brackets that will carry the expansion link brackets ; these are drilled through the frame in the position shown, the pads themselves being cut out of small pieces of sheet-brass. The bosses pass through the pads, finishing flush at the back, or pad face, but project a little in front, giving a very pleasing round boss showing for the bolt head to sit on.

The first job is to clean up the casting very carefully, using fine files or " riflers " to remove the " froth " from the sunken portions of the motion-plate frame. Then file up all the edges, leaving all outside edges slightly round. When doing this, call to mind the appearance of the usual casting of this nature, and you cannot go far wrong. A point to watch is the gap with the wide slot at the top ; this takes the radius-rod, which will require working clearances from side

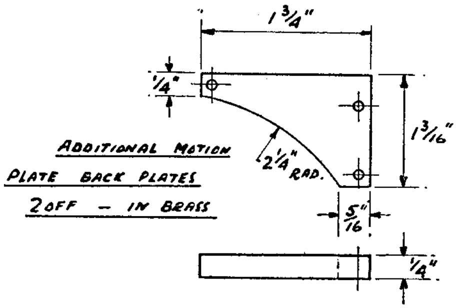
to side, and up and down, whilst the enlarged part of the opening is to allow the fork of the rod to enter when the gear is set up. It is not absolutely necessary for the wide part to be quite concentric or rather, central with the slot below it, for the radius-rod does not actually work in it, once the gear is assembled.

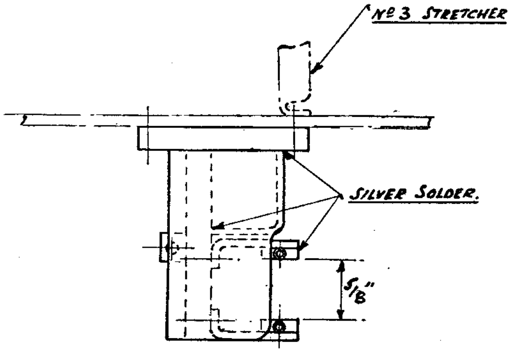
The main datum edge is the top edge; this should be filed straight and flat, after which the face of the first guide-bar lug should be brought down to the dimension given. Now finish the other lug face to the gap dimension, drill both lugs and generally clean up round the edges of the lugs. You will now have your first working position settled, and from this you can determine not only the width but the position of the radius-rod slot. Now drill the holes, that will position the pads mentioned, and make up the parts to be ready for silver-soldering. Incidentally, the drawing does not show the slot widths—the narrow part of the slot should be $\frac{3}{16}$ in., and the wide part, $\frac{7}{16}$ in. or, at least, a very full $\frac{3}{8}$ in. if it looks like spoiling the beading round the edge. The other dimension of the fork that has to go through the large gap, is $\frac{1}{4}$ in.

Now turn your attention to the heavy backplate which provides the actual attachment to the locomotive frames. If everything has been so far made to drawings, its position should be as shown in relation to the No. 3 stretcher, making use of two of the bolt holes drilled and filled with dummy rivets. In this case, remove two unwanted rivets and replace with bolts. The backplate should also come level with the top of the frames (the low part of the frames), and when positioned, the extra fixing hole at the forward end can be drilled for the third bolt through the frames. Mark the two plates, and leave them in place for the time being.

There is a critical position for the motion plates, measured from the back face of the cylinder block itself, to the face of the expansion link bracket pads when finished and filed up—the pads come at the *back* of the motion-plate, so you will have to take the thickness from the pad face to the bolt boss at the back, and subtract it from the vital dimension in question—the dimension is 4 11/32 in. exactly. When I say *exactly*, in this case, I mean as accurately as it is possible to read an ordinary steel rule, so don't worry about "thou's" or even hundredths.

Now make up the bent plate portion as shown on the drawing, remembering to cut them out the same, but bending them up "handed" or opposite ways. That is as far as you will be able to go for the moment, so you might as well make up the brackets and the bearing bushes that are silver-soldered into them. It will be noticed that the working centre of the bracket is below the centre-line of its two fixing holes, and all brackets are fitted with the working centre down, and not up. Also, the bearings, two "blind" and two through drilled, are disposed so that the "blind" bushes come on the outside of the bracket. There is nothing to prevent you using all "blind" bushes if you prefer this type. Some folk believe they hold the oil much better; in theory, I suppose they do, but in practice I doubt if there is anything in it; in a *long* bearing, this point might carry weight, but these bushes are very short indeed, there being no room for longer bearings, much as I would have liked to have had them.





The brackets have their "feet turned in," and the bearings are put in and silver-soldered in place from the inside. I think the addition of the little oil-cups is worth while, although the inside one may be a bit tricky to get at later on.

Now fit the brackets to the motion-plates, making sure that the gap of $\frac{5}{8}$ in. is maintained between the inside faces of the bearings and perfectly true with the slot in the motion-plate. The dimension from the back of the bracket (or bolting face) to the centre of the bearing is quite critical, or at least it is in *pairs*; any discrepancy here will cause the expansion-link to run out of truth and bind on its supporting trunnions, causing excessive wear on the die-blocks, and all manner of other troubles; so please take great care with this part of the valve-gear.

If you intend to use silver-solders of two melting points (and it will make the job much easier and safer if you do) you can fit up the pads and bosses on the motion-plate for keeps; use the higher melting point material for this, after which the pad faces can be filed down true and flat, ready to take the brackets.

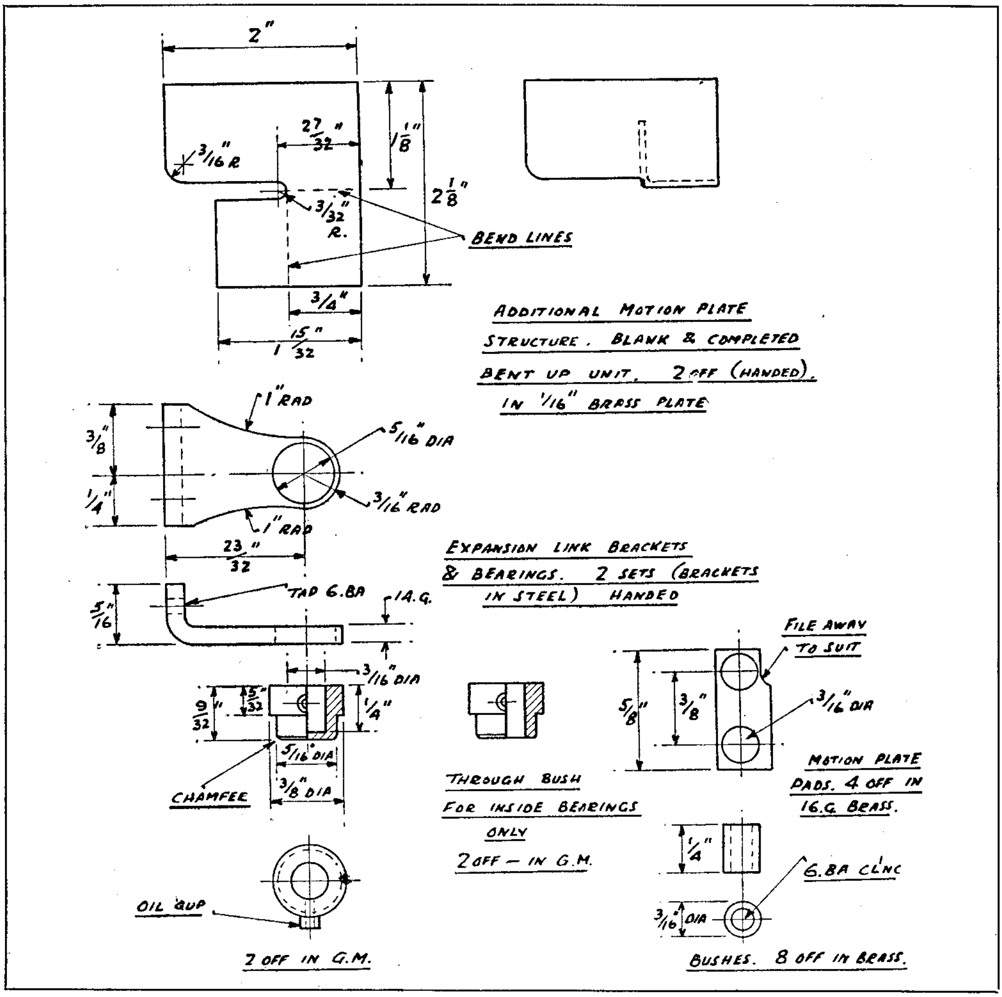
Without the guide-bars, the erection of this part of the gear cannot be continued, and as I cannot put these in without getting out of step with the series, we must discuss other things. In any case, I feel you will have quite enough

to go on with for the time being, so now for general interest items.

Does Stainless Steel Wear Well?

The best way to prove or disprove this is to quote real examples. Last time I was at the "M.E." Exhibition, I had *Centaur* with me; she had been doing a spot of passenger hauling on the track, and everything had been going well until I let her do a turn in the hands of one of the experienced drivers of the S.M.E.E. I don't know whether engines are really of a cussed turn of mind, but she got a gauge glass bunged up with some queer substance that failed to budge when the driver attempted to blow the glass down; being a good driver, he took her out of service, and drew my attention to the trouble when I became available.

I always keep my boilers clean, and bunged-up glasses or fittings have never been my brand of trouble, but I cleared it out and thought no more of it. But a more serious trouble began to make itself apparent—the lagging round the firebox began to crumble and *disappear*; I bought some "first aid" materials on one of the exhibition stands, just to fake up the untidy firebox for appearances only. I then noticed that the control valve for water in the tender would not turn off; I cussed a bit, and decided that the old lady would have to be shopped as soon as possible.



It was not until I got her home that the trouble really started; practically all the lagging broke up and had to be removed, she started to blow past either the valves or pistons—I didn't know which at that time, and even the stainless steel hand-rail knobs came off where they entered the boiler barrel. These were plugged for the time being, and I steamed her gently—just in search of more trouble. When I came to open the regulator, it would not budge so that put the final seal on a complete strip down.

This is what I found. The regulator, made in stainless steel throughout, had entirely disappeared except for the disc-valve portion.

Most of the backhead fittings fell off when tapped—just eaten right through. That gave me quite enough to go on with, so off came the boiler complete, and into the pickle bath for a general clean, and once more I had a surprise—certain chemical reactions gave clear indications that a quantity of concentrated nitric acid had somehow got into the boiler via the normal tender supply, and its vicious path through the engine had left a very marked trail.

How such a corrosive came to get into the tender, is quite a problem ; I cannot think that anyone but a complete madman would be evil enough to do it on purpose, and if there was some distorted purpose directed to an attempt to wreck the engine, then I am afraid the attempt failed. Owing to the enormous strength of the boiler and the method of its construction, repairs were made in time, and a test to 320 lb. proved it for further service.

Now came the engine chassis. This was stripped down completely ; pistons and cylinder bores undamaged, and with a surface like glass. Definitely no leakages past the pistons. Next came the piston valves, and I happened to remember the exact size of the bobbins when they were made—$\frac{5}{8}$ in. plus two thou. ; I measured them carefully once more, and was amazed to find not as much as one ten-thousandth wear, and with perfect roundness and a glass-like finish.

The valve bores, made in a special chilled hard bronze, had become barrel-shaped in the centre, or where the bobbins had worked, so these were reamed out and new bobbins made—much care being taken to get the fits exactly right.

In due course, when new fittings had been made, and the boiler lagged and stoved, the engine was reassembled. She looked like a brand new job. Then came the steam tests—first on the test stand, and then on the track. After a little initial running in, the wheels were locked and the regulator opened wide ; there was absolutely no blow past at all, and a match held over the chimney was not even caused to flicker—end of the story. She is now running better than she has ever run, uses very little water and hardly any coal. In this particular connection, we had a test for endurance when she was on the test stand, and when friend Duncan was with me. "Let's see how long she will steam on one firing, and maintaining full working steam pressure," he suggested. I thought it would be interesting to find out, so I made up the fire and settled on 90 lb. as the minimum working pressure. We let the engine do some work while the test was going on, mildly to simulate light hauling going on, and left the donkey-pump ticking over to maintain water ; she ran for one hour and seven minutes before the pressure dropped a couple of pounds below 90 lb., and called it a day—not such a bad performance.

This is straying well away from the wearing qualities of stainless steel, but I have given you the whole story showing on the one hand, how well the piston valve bobbins stood up to hard usage, and on the other—why not to allow nitric acid to be put in the tender.

I suppose there ought to be a moral in this ; the only thing I can think of at the moment is : "When working, keep your locomotive in sight as much as possible."

A Pleasant Change

To show the other side of the story, I have just returned from a trip up north, during which I gave a talk to the Stockport Society and later, the Hull Society—quite a strenuous job for me these days, and one that I couldn't do too often. I was quite moved by the wonderful kindness and hospitality shown to me by both societies ; what a wonderful bunch of fellows they are. I am much more than grateful to them for all their kindness, and hope to have the opportunity of visiting them again one of these days. And are they keen ? Some of the boys down south here would be interested to see their enthusiasm.

(To be continued)

For the Bookshelf

Modern Railway Motive Power, by Brian Reed. (London : Temple Press Ltd.) 170 pages, size 5 in. × $7\frac{1}{2}$ in. Illustrated. Price 8s. 6d. net.

Railway motive power today comes under four separate and distinct headings : Steam, Diesel, Electric and Gas-turbine. Each of the first three is capable of sub-division to a greater or lesser extent, but the fourth is, at the moment, in the experimental stage though enough is known about it to enable some comparison to be made with the other three.

In this book, the author presents his readers with a fairly comprehensive account of developments in all four branches of motive power on the world's railways during the past few years, and he shows plainly the stage at which each has arrived, so far. His comparisons are interesting and instructive, as well as being, to some extent, critical. He does not condemn, however, and we find this refreshing in a critical causerie ; the pros and cons of each form of motive power are discussed, and the present trends of construction are described.

Twenty-four well-chosen halftone illustrations on eleven inserted plates depict modern examples of locomotives of all four basic types, while many drawings, diagrams and tables in the text enable the reader to appreciate the trends which lie at the root of the design of modern motive-power units. It is interesting to note that twelve out of the sixteen chapters are devoted primarily to a consideration of steam locomotive design and construction, and appear to open up a big field for future investigation and possible development, even though the author refrains from making specific suggestions. We commend this book to the attention of anyone who is interested in railway traction.

PRACTICAL LETTERS

In a "One Manpower" Workshop

DEAR SIR,—Since writing the above-named article in THE MODEL ENGINEER January 18, 1951, I have added a tension-spring which has so increased the efficiency of the treadle that I would like to recommend it to all "foot operators" using a single-acting treadle. The spring is attached to the treadle-arm and anchored to the lathe stand by a connecting strip. The tension is adjusted so that the spring is stretched ½ in. when the treadle is at the top of its stroke.

Thus, now, when the pedal is depressed, energy is stored in the spring as well as the flywheel and the return stroke is "powered" by them, thus maintaining a more effective thrust which is easier on the legs owing to the greater stability especially when cutting heavily in direct-gear.

Yours faithfully,
Newcastle-on-Tyne. F. T. LEIGHTWOOD.

Electrified Fencing

DEAR SIR,—With reference to the query and reply on the above subject which appeared in THE MODEL ENGINEER of November 2nd, I give herewith a wiring diagram of a unit that was made up in a 14th Army workshop in Burma for use on an army pig farm.

As can be seen, the power is supplied by a six-volt car accumulator. Six volts are applied between the low line and earth. As soon as an animal makes a connection between earth and the low line a positive voltage is put on the valve grid which operates both relays, energises the vibrator pack, and gives the animal a 500-volt jab through a 50 KΩ resistor. It will be noticed, however, that as soon as the animal moves away from the fence (presumably it doesn't waste much time) the unit resets itself.

This unit was, as far as I can remember, highly successful, and the consumption during off-load periods (shall we say "waiting time") is only the .3 amps. of the valve heater.

I regret that I do not remember the type of valve used, but that should not present any difficulty. All the components can be purchased from shops selling *ex*-W.D. components.

The lines should be well insulated by being mounted on porcelain bobbins or cleats.

Yours faithfully,
Hitchin. G. A. WALTER.

A Sturdy Veteran

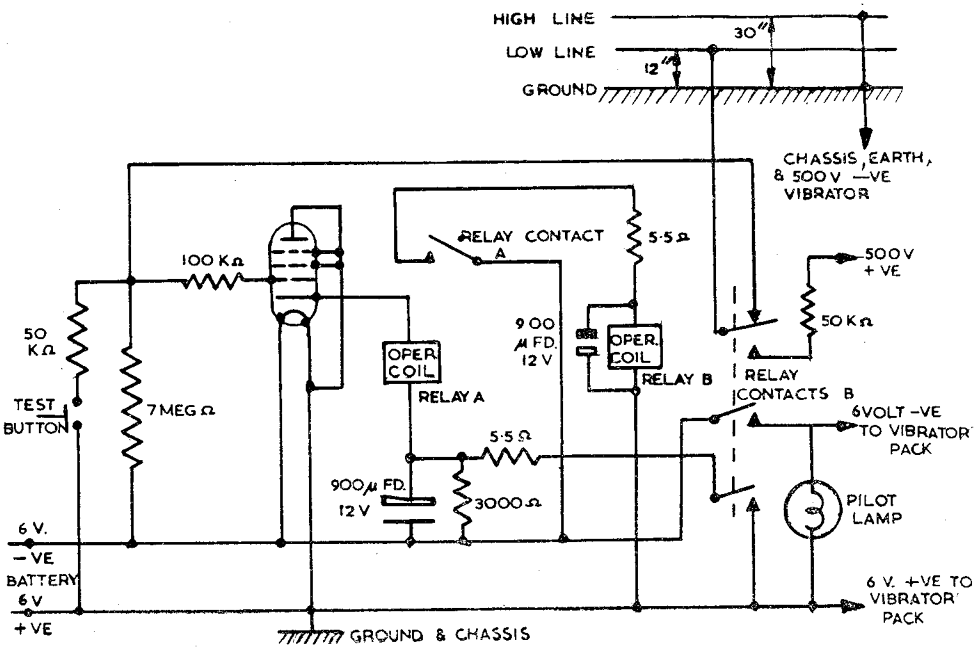
DEAR SIR,—In your issue of December 7th, 1950, I noticed a photograph bearing the inscription "How many more of this vintage left, we wonder?".

I am a member of Radley College and we have in our workshop a 3½-in. Drummond. It came from Eton College Mechanics School, I believe, originally, and has put up a very good performance considering its age and the curious assortment of individuals who use it!

Recently it was taken right down and, under the supervision of our art and workshop instructor, Mr. Ellis, a truly excellent man, adjusted, checked and repainted in grey with red trimmings.

It possesses a full set of change wheels, three- and four-jaw chucks, and three faceplates.

Incidentally, I see in the photograph a swarf collecting tray in front of the saddle. I do not know if this is a standard item of equipment,



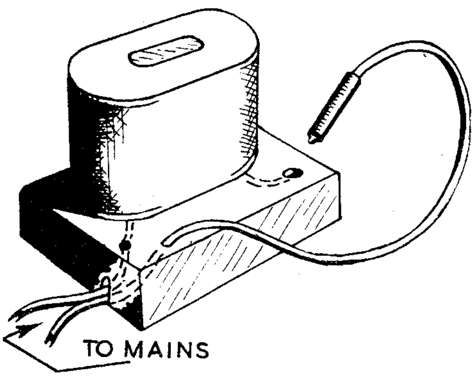
but I was instructed about two years ago to make one to keep the swarf from the centre leadscrew. I also made one to go aft of the saddle.

Recently we applied to Messrs. Myford for some parts which needed renewing and we were really surprised to find that they could supply us with all but one or two, which is no small feat, considering that it went out of production in 1910!

Yours faithfully,
Abingdon. J. B. G. CAIRNS.

A Simple Demagnetiser

DEAR SIR,—With reference to the query from H.N. in THE MODEL ENGINEER for November 9th, last, regarding a demagnetiser, the following notes about a small one I made might be of some use to him. Information on this subject seems very hard to come by and all the text-books I consulted were very reticient; however, I finally experimented with two coils I had which to the best of my belief have a total resistance in series of about 230 ohms (some 400-odd yards of No. 36 wire). For convenience in mounting, these were threaded on a wooden core plug fastened upright to an insulated base and wired for connection to



220-volt mains. Only a few seconds is necessary for demagnetising, and, as these coils get a bit warm, there is a well-insulated wander lead making contact with a stud instead of a switch, so that it cannot inadvertently be left connected after use. Although I do not pretend this is a complete answer, I found the arrangement sufficient for small screwdrivers, tweezers, etc., but imagine a single coil of similar resistance would be rather better and possibly a laminated iron core would increase the strength. However, as it did what I wanted I left well alone. I give a rough sketch of the gadget.

Yours faithfully,
Croydon. R. H. FRY.

Silencing Problems

DEAR SIR,—Referring to Mr. E. A. Walker's letter on the difficulty of adequately silencing model i.c. marine engines, page 36, January 4th issue, I believe that the most efficient system yet devised is that embodied in the Servais silencers which are used extensively on cars and commercial vehicles. Let me admit that I have no knowledge of the special conditions which may apply to model i.c. engines, but it seems that it might be worth while to conduct experiments to discover if the Servais principle could be scaled down and suitably adapted. It is, of course, possible that someone has done it already, but if this were the case I think we should probably have heard something about it.

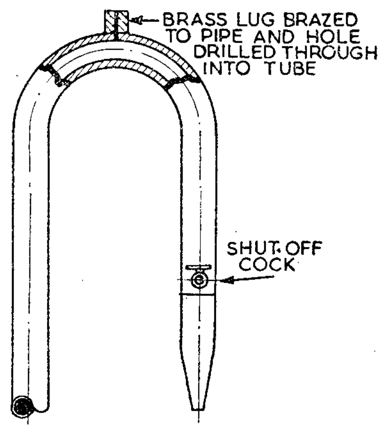
As regards the improved efficiency of this type of silencer, by comparison with the conventional baffle plate type, I can speak from personal experience, having made direct comparisons on a three-litre car engine. Reduced back pressure was obtained, reflected in an improved road performance, coupled with considerably quieter running.

It remains to be seen what will happen in a greatly reduced scale, but I offer the suggestion for what it may be worth.

Yours faithfully,
London, W. JOHN H. AHERN.

Self-balers for Boats

DEAR SIR,—With reference to your article "Experiments with Radio Control Model Boats," your contributor, Mr. Harvey A. Adam, misses an important point with his description and sketch of a self-baler. A moment's consideration will show that if a boat loses way with the "U" full of water and the waterline is above the inboard end of the pipe, the short leg of the "U" becomes the long leg, and the self-baler a self-filler, by the siphon action set up.



In full-size practice this trouble is overcome by making a small air bleed hole at the highest point of the "U." There is no water leakage when the baler is operating; if the small vent is inadvertently choked when painting bilges, trouble is experienced by flooding of the compartments served by the baler so choked. It should also be noted when using self-balers that should a craft start to make water, a further inlet is provided immediately the top of the "U" falls below the waterline. Provision should, therefore, be made for turning off balers when craft is moored or in cases of emergency.

Yours faithfully,
Burton Joyce. R. H.